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3. SEQUENCE AND DESCRIPTION OF POST-RETRIEVAL OPERATIONS

At the conclusion of waste retrieval and underburden sampling operations, the project will perform shutdown activities to place the excavation and facility into safe, known, and stable conditions where it will remain in layup until D&D&D operations begin. While it is assumed that D&D&D of the facility will begin as soon as practicable, the facility, as designed, can safely accommodate up to a 1-year delay.

Decontamination activities during facility shutdown and D&D&D are contingent on contamination levels inside the facility after retrieval operations are complete and on desired disposition paths for waste materials resulting from D&D&D activities. Anticipated ranges for TRU contamination levels after retrieval operations are shown in Figure 3. Expected waste types and disposition paths for equipment and materials from D&D&D are identified in Table 1. If contamination levels are significantly higher or lower than these anticipated ranges, other approaches and disposition paths may need to be investigated and implemented to provide more appropriate and cost-effective completion of this work.

The OU 7-10 demonstration project is a CERCLA activity, which makes the ICDF the preferred path for treatment and disposal of secondary waste streams and D&D&D debris. The primary ICDF waste acceptance criteria requirements of concern to this project are (1) that the materials have less than 10 nCi/g of TRU contamination and (2) that there are no visible stains from RCRA-regulated materials. Contaminated materials and equipment will be decontaminated only to the extent necessary to protect workers and to meet the ICDF waste acceptance criteria. A fixant then will be sprayed to prevent contamination spread during facility layup, facility D&D&D, material transport, and disposition. Thorough decontamination of all materials will not be necessary. Strippable paint will be used as the fixant to immobilize residual removable contamination and to provide flexibility for D&D&D operations. That is, the dried strippable paint may be removed, if needed, as a means of decontamination during the final facility decontamination. In addition, it may be left in place as a fixant to reduce the risk of radiological uptakes during dismantlement.

3.1 Facility Shutdown Process

Closing the facility down following the completion of retrieval operations consists of four main functions:

1. Decontaminating the PGS, RCS, and equipment inside the confinement areas
2. Backfilling the open excavation
3. Immobilizing residual removable contamination on surfaces inside the confinement areas
4. Securing the equipment outside the confinement areas (in the WES).

These four activities are shown in Figure 4 and discussed in detail in the following sections.

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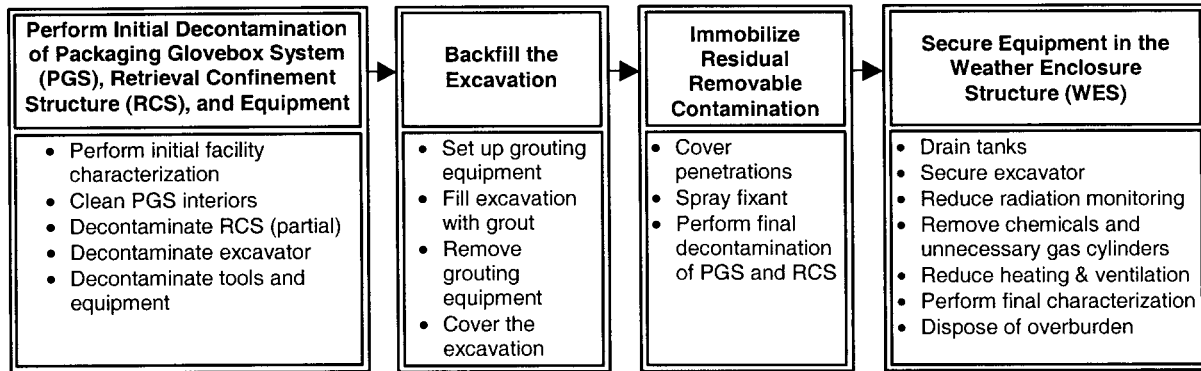


Figure 4. Summary of four main functions of the OU 7-10 Glovebox Excavation Method Project facility shutdown process.

3.1.1 Initial Decontamination of Retrieval Confinement Structure, Packaging Glovebox System, and Equipment

The first activity in the shutdown process is the initial decontamination of the confinement areas (see Figure 5).

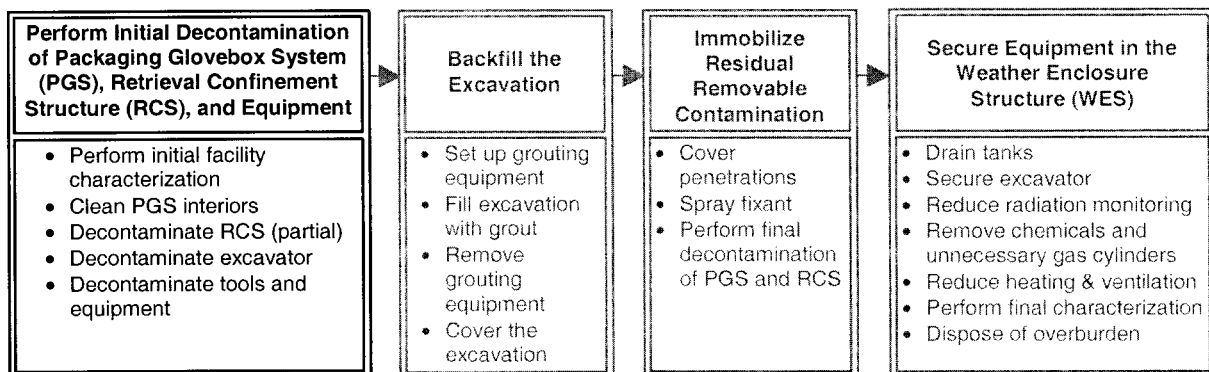


Figure 5. Initial decontamination in the OU 7-10 Glovebox Excavation Method Project facility shutdown process.

3.1.1.1 Approach. The confinement and internal equipment will be decontaminated only to the level necessary to protect workers during subsequent activities and to reduce the volume of TRU waste resulting from D&D&D of the facility. An initial survey of the interior surfaces of the PGS and RCS will be performed to establish initial conditions and determine PPE requirements. Results from smears will be used to determine what surfaces must be decontaminated to reach an overall concentration of less than or equal to 10 nCi/g TRU radionuclides. This gross decontamination will reduce the inhalation hazards and prevent workers from resuspending contaminated dust during shutdown operations.

Anticipated ranges for contamination levels are shown in Figure 3. Areas that are expected to be highly contaminated (higher than 1×10^6 dpm per 100 cm² of alpha contamination) include the H&V ducting and filters, the floor (where waste materials may have been spilled), and the gloveboxes (where materials are handled within closed areas). Areas expected to be contaminated in the range of 20 to 5×10^5 dpm per 100 cm² of alpha include the remaining surfaces inside the RCS. Areas around the

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drumout ports of the gloveboxes are intended to be kept clean, but because of the nature of the operation, will be considered suspect. It is anticipated that contamination levels of these areas (i.e., within the drum loadout enclosures) will be 20 to 100 dpm per 100 cm² of alpha contamination.

3.1.1.2 Process Description

3.1.1.2.1 Initial Facility Survey and Characterization—As mentioned above, an initial characterization of the facility will be performed. This effort will start with the interior surfaces of the PGS gloveboxes and drum loadout enclosures and then the interior of the RCS. Process knowledge of contamination events (or lack thereof) should be sufficient for areas within the WES and transfer vestibule. Characterization will include determination of radiological contamination levels as well as radionuclide speciation (needed for safety analysis and waste inventory planning). The primary purposes of this initial characterization are to (1) establish initial conditions of the facility, (2) identify which materials will require decontamination to achieve the desired disposal path, and (3) determine appropriate PPE levels and stay times commensurate with facility conditions.

Radiological Control personnel will first determine the levels of airborne contamination within the confinement areas using remote means. Additionally, smears may be taken of the interior surfaces through available gloveports and the smears bagged out through sample ports for counting. When appropriate PPE has been determined, sampling personnel will enter the confinement areas with support from the radiological control technician (RCT) to collect the necessary samples. In addition, limited sampling for hazardous contaminants (e.g., for polychlorinated biphenyl), if required, may be performed at this time to support detailed planning for the D&D&D and waste disposal.

3.1.1.2.2 Packaging Glovebox System—All small, removable tools will be bagged out of the PGS gloveboxes and disposed of as MTRU waste. The PGS transfer carts will be cleaned of loose waste and dirt and then driven or pushed out of the gloveboxes and into the RCS for subsequent removal during decontamination activities. The gloveboxes then will be cleaned with a vacuum, including gloves, hoists, carts, and cart-drive systems. Wiping of difficult-to-reach areas with long-reach tools may be required. All gloves not needed for the remaining process will be removed and the ports sealed with covers or plugs.

3.1.1.2.3 Initial Decontamination of the Retrieval Confinement Structure—Contamination levels inside the RCS after retrieval operations may exceed 1×10^6 dpm per 100 cm². To reduce the exposed waste as a continual source of airborne contamination, the excavation will be kept in a dampened state using the dust-suppression water spray system. Personnel will enter the facility wearing appropriate PPE, decontaminating the floor as they enter. Decontamination of the floor is expected to be accomplished using a vacuum and wet wipes, by removing only gross surface contamination. Any loose pit materials inside the RCS will be wetted to reduce dust and then returned to the pit. Strippable paint may be used on the floor to decrease contamination levels if acceptable radiological conditions are exceeded.

Once the floor has been cleaned, surfaces that would release contamination if brushed by personnel working in the facility (e.g., handrail around the pit, walls within 2.5 m [6.5 ft] of the floor, and personnel access doors) will be decontaminated with water and wipes. The PGS transfer carts will be removed from the rails and drive systems with the aid of the excavator for lifting. Then they will be wrapped in plastic,

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and placed in the south corner of the RCS between PGS-3 and the personnel emergency transfer vestibule (i.e., in a location that will not block the emergency egress route). Gross contamination will be removed from windows and bag-out ports using water, glass cleaner, and wipes. Gloves in the RCS wall will be removed and the ports sealed with covers or plugs. The internal face of the shoring box will be cleaned of loose dirt and waste using wet wipes on mop handles. The shoring box will be subsequently sprayed with strippable paint to affix any remaining contamination. At this time, the upper sections of any vertical probes (i.e., from the top to at least 0.9 m [3 ft] below grade) also will be coated with a fixant, possibly strippable paint. Long-reach spray wands will be necessary to coat all sides of these probes. The removable sections of hand railing will have to be in place or other forms of fall protection used during entries into the RCS to protect workers from falling into the excavated area.

3.1.1.2.4 Excavator—The attached excavator end-effector will be placed on blotter paper that has been placed on the floor between the pit and the personnel access door. The arm should be extended in a position to allow for decontamination of the arm and attached end-effector without the use of a ladder. Grease and sludge will be scraped off of the excavator and disposed of as a mixed waste (carryover of waste codes from the pit waste, not necessarily from the grease). If fixants are needed, visible grease stains and dirt will be removed first using a nonhazardous industrial detergent, then strippable paint will be sprayed on the surface. The excavator arm is then covered with plastic in such a way as to still allow arm movement. The arm then will be retracted and the end-effector placed on another piece of blotter paper near the pivot point.

3.1.1.2.5 Tools and Equipment—Smaller loose items and tools inside the RCS and PGS will be bagged out or drummed out either through the PGS or through the RCS personnel access door and disposed of as MTRU waste. Larger objects (e.g., excavator tools) will be decontaminated as needed to remove a significant amount of loose material and then bagged to cover remaining contamination.

3.1.1.2.6 Areas Not Decontaminated—Although actual radiological conditions must be determined at the time, it is anticipated that the remaining areas of the facility (e.g., the ceiling and upper walls of the RCS), will not require decontamination to achieve the desired waste disposition path.

3.1.1.3 Required Tools, Equipment, and Other Materials. Tools, equipment, and other materials required for initial decontamination activities are listed below:

- Radiological instruments
- Radiological and industrial PPEs, including fall protection lanyards
- Decontamination wipes
- Mops with decontamination wipes
- Water applicators (e.g., low-pressure garden sprayers)
- Plastic sheeting and tape for sealing penetrations and wrapping equipment
- Plastic bags (various sizes)

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- Fixant and strippable paint, spray equipment, and trained spray technicians
- Blotter paper
- Degreaser (nonhazardous industrial detergent)
- Scrapers.

3.1.2 Backfilling of Excavation

After the initial decontamination of the confinement areas is completed, the open pit will be backfilled, as outlined in Figure 6.

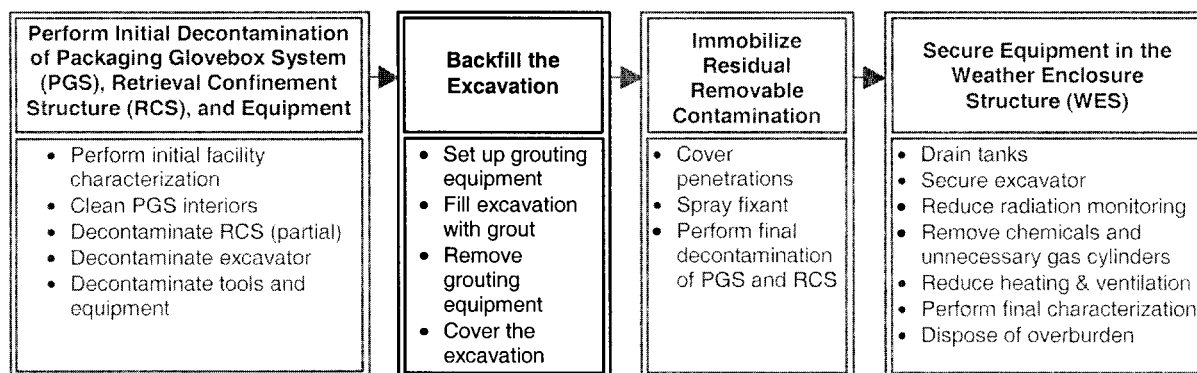


Figure 6. Backfilling the excavation in the OU 7-10 Glovebox Excavation Method Project facility shutdown process.

3.1.2.1 Approach. The excavated portion of the pit will be filled with a grout mixture that will be pumped into the open pit. An operator manning the hose fills the pit to approximately 15 cm (6 in.) above the bottom edge of the shoring box. This activity will leave approximately 1.5 m (5 ft) of the shoring box exposed and approximately 0.9 m (3 ft) of the upper excavation (i.e., overburden layer) to be filled later with approved soil fill material. This second backfill, when completed during D&D&D of the facility, will bring the excavation area back to final grade (i.e., the level of the surrounding OU 7-10 surface).

When the exposed waste has been covered and stabilized with grout, it is expected that personnel will be able to enter the confinement area with reduced fall protection equipment requirements. This will improve personnel mobility and efficiency. In addition, because the major sources of contamination have been cleaned or isolated (the PGS gloveboxes and exposed waste in the pit, respectively), contamination levels inside the RCS are expected to remain nearly stable after the grouting operation. However, radiological conditions will continue to be monitored.

3.1.2.2 Process Description

3.1.2.2.1 Grouting Equipment Setup—A grout hose will be connected in the WES between the pipe penetrations in the walls of the WES and RCS. A grout pumping truck will deliver the grout and the connection will be made between the truck and the WES pipe penetration. Workers will enter the RCS,

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wearing appropriate PPE, and connect the inner hose to the RCS pipe penetration, and then take the hose to the pit. The hose will be sleeved to reduce contamination on the hose surface, which decreases contamination spread when the hose is removed. The hose will be placed near the bottom of the pit to prevent disruption of the waste and contamination during the operation. Radiological air monitoring will verify safe conditions for the operators. After the hose inside the RCS has been connected, the open hose will be a potential contamination path. For this reason, the hose will remain capped until ready for use.

3.1.2.2.2 Filling the Pit—The operators will tie off or stand behind the pit railing and then, through radio contact, order the pumping of grout to begin. Operators will work around the probes that remain in the pit from the Stage I investigation. The operators will raise the hose from the pit as it fills, being careful not to let the grout fall more than a few inches to prevent stirring up large quantities of airborne contamination. The operators will continue to fill the excavation until the grout reaches a level approximately 15 cm (6 in.) above the bottom edge of the shoring box.

3.1.2.2.3 Grouting Equipment Removal—Once the grout addition operation is completed, operators will disconnect the hose connecting the grout truck to the WES and reinstall the cap. Then the hose inside the WES will be disconnected, placed in a bag, and stored in the WES. The hose in the RCS will be disconnected last. The sleeve on the hose will be removed carefully and the sleeve and hose will be placed in a bag and stored inside the RCS until the D&D&D phase. The caps on the pipe penetrations that were removed during hose installation will be reinstalled and sealed with silicone or tape as each hose is disconnected. Personnel should work from the outside in when removing the hose and resealing the wall penetrations to prevent potential contamination spread outside the RCS via the hose.

3.1.2.2.4 Covering the Pit—The grout does not form a monolith when cured, but has properties similar to gravel or sand. When cured, the material will be more permeable than soil and the pit should experience less subsidence. After the grout is cured, personnel will access the pit surface to place a sheet of plastic over the pit to prevent contamination of the grout surface and probe tops during the remaining operations.

3.1.2.3 Required Tools, Equipment, and Other Materials. Tools, equipment, and other materials required for pit backfilling activities are listed below:

- Radiological instruments
- Radiological and industrial PPEs, including fall protection lanyards
- Silicone or tape for resealing pipe penetration caps
- Grout truck
- Grout hoses for outside WES, inside the WES, and inside the RCS
- Plastic sheeting and tape
- Wrenches
- Large bags for hoses.

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3.1.3 Spray Fixant on Interior Surfaces of the Retrieval Confinement Structure and Packaging Glovebox System

After the open excavation is backfilled, the facility and equipment will be characterized again to determine radiological contamination levels. Then fixant will be sprayed on the interior of the confinement structures to immobilize residual removable contamination (see Figure 7).

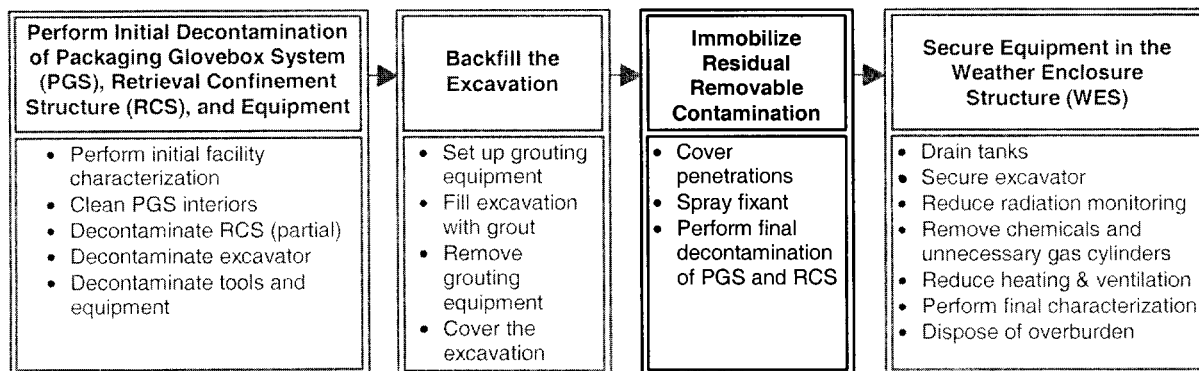


Figure 7. Fixant spraying in the OU 7-10 Glovebox Excavator Method Project facility shutdown process.

3.1.3.1 Approach. With the exception of windows, strippable paint will be sprayed on the remaining surfaces inside the RCS and PGS to affix any remaining contamination. The facility will be characterized first to provide D&D&D with the necessary radiological data for dispositioning waste. Penetrations for gloves and bag stubs will be sealed with port covers. Windows will be decontaminated to allow use during D&D&D operations.

3.1.3.2 Process Description

3.1.3.2.1 Introducing the Manlift into the Confinement Area—A temporary airlock will be constructed in the WES vestibule to allow a narrow-wheel-base, articulated-boom manlift to be brought into the RCS through the existing double doors. Doors leading from the vestibule to the exterior of the WES will be sealed with tape after the manlift is brought into the vestibule. Then the double doors to the RCS will be opened to allow the manlift into the RCS. Following closure of the double doors, the vestibule will be surveyed and released as a clean area. This procedure will be repeated to allow large equipment in and out of the RCS. Airlock materials will remain in place (where possible without space conflicts) through the D&D&D phase. The manlift will be used to support characterization sampling, radiological control surveys, application of strippable paint, and, if necessary, decontamination activities to be performed inside the RCS. The manlift will have sufficient vertical and horizontal reach (5.5 m [18 ft] and 6.4 m [21 ft] respectively) to allow access to ceiling and upper wall areas. However, access to some ceiling and wall areas still will require the use of long-reach tools (i.e., 1.5 to 1.8 m [5 to 6 ft] in length). It may become necessary to remove the transfer cart support structures and the boxes used to stage fire suppressant sand and absorbent material to increase the areas accessible by the manlift. If removed, the dismantled transfer cart support structures and staging boxes can be placed on the grouted pit surface pending further sizing or packaging during the D&D&D phase.

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3.1.3.2.2 Removing Transfer Cart Support Structures and Boxes—If necessary to increase the areas accessible by the manlift, the transfer cart support structures and the boxes used for staging fire suppressant and absorbent material (used for stabilizing free liquids encountered at the digface) will be removed to allow the manlift to be driven around the back side of the excavation area. Removal will be accomplished by unbolting the items from the RCS floor and using the excavator to place them on the grouted pit surface. Some cutting of structural members will be necessary (e.g., the transfer cart rail support plates will need to be cut because they extend from the RCS back into the gloveboxes).

3.1.3.2.3 Sampling Interior Surfaces of the Retrieval Confinement Structure—Workers will perform radiological and hazardous sampling of the RCS interior for material characterization by using RCT support and the articulated-boom manlift. Characterization is needed to ensure that appropriate staging, containerization, and marking requirements are followed during D&D&D and that the proper disposition paths are determined.

3.1.3.2.4 Closing Valves and Covering Penetrations, Tools, and Equipment—For systems no longer needed (i.e., DSS and PGS fire system), the valves on the piping will be closed to reduce the possibility of contamination outside of the confinement barrier. If no valves are on the pipes, or the valves are at the equipment instead of near the confinement area wall, the pipes will be cut, surveyed for contamination, and each end will be sealed. The cut location will be positioned as close to the confinement area walls as practicable.

Penetrations for pipes and bag-out ports inside the RCS and PGS will be sealed with covers. Covers may be standard purchased items or plates that are seal-welded over the penetrations. Any tools or equipment that will not be sprayed (i.e., excavator end-effectors, and fire detection and suppression equipment) will be bagged out or taped over. Inlets to and areas around the HEPA filtration system from the RCS will be decontaminated.

3.1.3.2.5 Spraying Fixant—Radiological Control personnel will take radiological assessment surveys required to characterize the facility for disposition of materials during D&D&D operations. Exposed surfaces (except windows) within the RCS and PGS then will be sprayed with strippable paint, starting with the gloveboxes and finishing at the door exiting the RCS at the transfer vestibule. Care will be taken around the HEPA filters to ensure that paint does not enter into the ventilation system. Any gloves that are no longer required will be removed and the port will be sealed with a cover or plug.

Note: If airborne contamination levels before or during spraying of strippable paint are high enough that Radiological Control requires it, a localized application of water mist with glycerin will be applied before the paint.

3.1.3.2.6 Final Decontamination and Radiological Surveys of the Retrieval Confinement Structure and the Packaging Glovebox System—After the paint has dried, the facility will be checked to ensure contaminants are adequately fixed and that radiological conditions inside the RCS and PGS are stable and radiological detectors and alarms are adequate. Any final decontamination of the RCS and PGS required to close the facility for layup will be performed at this

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time. It is expected that conditions will allow the number of radiological detectors and alarms to be reduced at this time.

3.1.3.3 Required Tools, Equipment, and Other Materials. Tools, equipment, and other materials required for these fixant application activities are listed below:

- Radiological instruments
- Radiological and industrial PPEs, including fall protection lanyards
- Temporary airlock enclosure
- Articulated-boom manlift
- Covers for penetrations (e.g., steel, plastic, and tape)
- Water and glycerin sprayer (if needed)
- Strippable paint, spray equipment, and trained spray technicians.

3.1.4 Secure Equipment in the Weather Enclosure Structure

After the fixant has been sprayed on the interior of the confinement area structures, the equipment in the WES will be secured (see Figure 8).

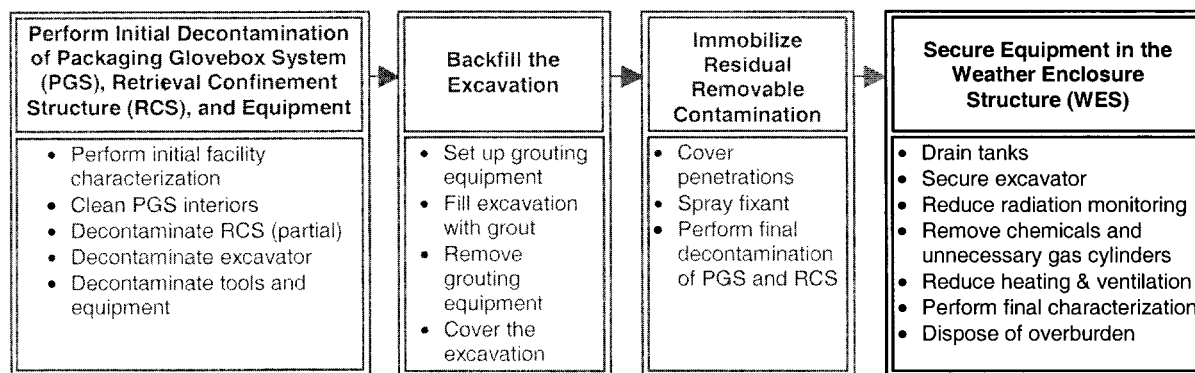


Figure 8. Secure equipment in the OU 7-10 Glovebox Excavation Method Project facility shutdown process.

3.1.4.1 Approach. Equipment in the WES (e.g., water tanks, H&V systems, and monitors) will be placed in a safe condition to enable the facility to remain unused until D&D&D operations begin. The H&V system will be needed during facility layup and possibly during D&D&D operations so will be left operating, but at a reduced airflow and temperature. Radiological conditions will be reassessed and the number of radiological monitors and alarms will be reduced accordingly.

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3.1.4.2 Process Description

3.1.4.2.1 Water Tanks—Fire protection systems for the RCS will remain operating. However, with no operations in the gloveboxes, the PGS fire system will not be needed and will be removed from service. Water will be drained or pumped from the DSS and the glovebox fire-mist-system tanks into a water tanker truck. Although no contamination of the water is anticipated, samples will be taken and analyzed by Radiological Control to ensure the water is clean. The truck will deliver the water to the CFA sewage treatment facility.

3.1.4.2.2 Excavator—The excavator hydraulic fluid is expected to become contaminated through the hydraulic cylinder rods exposed in the excavation area. A sample of the fluid will be taken and analyzed by Radiological Control to determine the actual amount of contamination. If determined necessary by Radiological Control, the hydraulic fluid will be drained, and the hydraulic system flushed to reduce contamination. Absorbents will be added to the drained hydraulic fluid and the mixture will be sent to the AMWTP for treatment and disposal. The system then will be refilled with clean hydraulic fluid.

Because the excavator is expected to be used during dismantlement, fluids will be left in the excavator with the exception of diesel fuel. The diesel fuel will be drained (to reduce fire potential) and surveyed. If it is verified clean, the diesel fuel will be returned to the diesel fuel storage tank located on the diesel generator. The excavator battery will be disconnected.

3.1.4.2.3 Radiological Monitoring Equipment—Most radiological monitors, alarms, and friskers will be left in place and in operational condition for the layup period. Two noteworthy exceptions are the PGS fissile monitors and the criticality alarm system, which may be left in place but will not be left operating. The radiological conditions of the facility will be reassessed and it is expected that the number of radiation and contamination monitors and alarms will be reduced at that time. In addition, all nonessential radiation sources (i.e., controlled) can be removed from instrumentation at this time.

3.1.4.2.4 Chemicals and Compressed Gas Cylinders—Any chemicals used during operations and decontamination will be removed and disposed of or sent to chemical reuse. Gas bottles for the PGS fire system will be surveyed for release and then taken to CFA Property Control as excess. Other gas cylinders supporting radiological equipment will remain in service through the facility layup phase and possibly used to support D&D&D.

3.1.4.2.5 Eye Wash Station—The portable eye wash stations will be needed during D&D&D operations and so may remain in place during the layup period.

3.1.4.2.6 Air Tanks—The breathing air receiver tank will be depressurized to the atmosphere inside the RCS.

3.1.4.2.7 Heating and Ventilation System—Air dampers will be closed and the airflow of the facility H&V system level will be turned down for the facility layup period. Entry by RCTs to monitor conditions within the WES is anticipated to range from daily to monthly, depending on radiological conditions. The temperature will be maintained at greater than 10°C (50°F) in the cold weather to ensure normal equipment operation.

3.1.4.2.8 Remaining Equipment in the Weather Enclosure Structure—All other equipment in the WES will be left in place but unplugged from power, including cameras, video

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monitors, scales, the sample cold storage cabinet, PGS power, forklifts, forklift charging station, and DSS controls. The H&V controls will not be de-energized and will remain operational.

3.1.4.2.9 Support Equipment Located Outside the Weather Enclosure

Structure—The PPE and shower trailer (if used), leased drum assay trailer (if used), plant air compressor, and the decontamination trailer (if used) will be removed from the area, returned, as appropriate, to the owner, RWMC, or CFA for reuse. The standby power diesel generator and skid-mounted load center will be kept in service to support the H&V system, radiological monitors, and fire detection and suppression systems. The Radiological Control office trailer, breathing air trailer, and existing field support trailers (WMF-657, -645, -646, and possibly WMF-613) will be left as-is for potential use during layup and D&D&D.

3.1.4.2.10 Final Surveys of the Weather Enclosure Structure—Final surveys of the WES and reviews then will be performed by Industrial Hygiene, Fire Safety, and Radiological Control to ensure the facility is stable.

3.1.4.2.11 Disposition of Overburden—The overburden soil that was removed from the excavation area during the retrieval operation may have been transferred to the ICDF or the RWMC LLW pit immediately after excavation for disposal or beneficial use (as fill material). If not, the overburden will have remained outside the WES stored in sacks. If it has been decided that this soil should not be reused as overburden on OU 7-10, then as part of the shutdown process, these sacks of soil will be taken to the ICDF or RWMC LLW pit for disposal or beneficial use.

3.1.4.3 Required Tools, Equipment, and Other Materials. Tools, equipment, and other materials required for equipment stabilizing activities are listed below:

- Water tanker truck
- Radiological survey instruments
- Transport truck.

3.1.5 Equipment and Facility Requirements During Shutdown Phase

The materials needed for each shutdown operation discussed above are summarized in Tables 9 and 10. Table 9 shows the equipment already in the facility from retrieval operations that must stay operational during the facility shutdown process. Table 10 shows the additional equipment that will be needed to complete the facility shutdown process.

Table 9. Equipment from retrieval operations needed during the shutdown phase.

Equipment	Location	Activity Requiring Equipment	Use
Breathing air system	WES	Initial decontamination of facility.	Supply air to workers entering the RCS to decontaminate and fix contaminants.

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Table 9. (continued)

Equipment	Location	Activity Requiring Equipment	Use
H&V system	WES	All shutdown activities.	Personnel comfort and radiological protection.
Critically safe vacuum	RCS and PGS	Initial decontamination of RCS and PGS.	Remove contamination from floors, walls, and equipment of RCS and PGS.
RCS and WES fire protection systems	RCS and WES	All shutdown activities.	Provide fire protection of facility and personnel.
Radiological monitors and alarms (except fissile monitors) and criticality alarm system	WES	All shutdown activities.	Radiological protection.
Uninterruptible power supply	WES	All shutdown activities.	Maintain power to facility safety systems.
Diesel generator	Outside the WES	All shutdown activities.	Maintain power to facility safety systems.
Facility lighting	WES	All shutdown activities.	Visibility during shutdown operations.

Table 10. Additional equipment needed for the shutdown phase.

Equipment	Location Needed	Activity Requiring Equipment	Use
Small hand tools	RCS	All shutdown activities.	Connect and disconnect grout tube.
Grout truck	Outside the WES	Backfilling the pit.	Supply pumpable pit fill material.
Water tanker	Outside WES	Draining PGS firewater and dust-suppression water tanks.	Transport water to CFA sewage treatment.
Transport truck (potential use)	Outside WES	Stabilizing equipment in the WES.	Transport overburden to ICDF or RWMC low-level waste pit for disposal or beneficial use.
Radiological decontamination and stabilization materials (e.g., wipes, mops, brooms, bags, tape, plastic sheeting, and silicone).	RCS and PGS	Initial and final decontamination of the RCS and PGS.	Decontamination and stabilization of facility—wiping, spraying, covering.

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Table 10. (continued).

Equipment	Location Needed	Activity Requiring Equipment	Use
Radiological survey equipment and materials (e.g., detectors and swipes).	RCS, PGS, and WES	All shutdown activities.	Determining radiological conditions.
Industrial hygiene air sampling and hazardous chemical detection equipment.	RCS, PGS, and WES	All shutdown activities.	Determining industrial hygiene conditions.
Anti-contamination clothing.	RCS and WES	All shutdown activities.	Personnel protection.
Strippable paint and sprayer.	RCS and PGS	Spraying fixant in RCS and PGS interiors.	Fix remaining contamination in RCS and PGS.
Covers for penetrations in the confinement area.	RCS and PGS	Spraying fixant in RCS and PGS interiors.	Covering penetrations to eliminate contamination paths outside confinement area.

3.1.6 Ending Conditions after Facility Shutdown

A summary of conditions expected after facility shutdown that will be monitored and maintained during the layup period are discussed below:

- **Stage I investigation probes**—The radiological contamination on exposed surfaces of any remaining vertical probes has been immobilized with a fixant, possibly strippable paint. The probes that were pulled during excavation have been laid on the sides of the excavation area and covered completely by grout. All probes are closed on both ends and are empty inside.
- **Pit and shoring box**—The pit has been filled with a weak grout up to 15 cm (6 in.) above the lower edge of the shoring box. This will be approximately 0.9 m (3 ft) below grade and leave approximately 1.5 m (5 ft) of the shoring box exposed. The exposed shoring box has been painted with strippable paint on the top and inside to fix any remaining contamination. A sheet of plastic has been laid over the grout and upright probe casings.
- **Equipment inside the RCS and the PGS**—Waste, grease, and loose dirt have been removed from the larger equipment inside the RCS and PGS and the equipment pieces are wrapped in plastic. Tools and other small items have been bagged out of the RCS and PGS for disposal.
- **Contamination on inside surfaces of RCS and the PGS glovebox skins**—All loose soil and waste has been removed from surfaces of the RCS and PGS. Gloves have been removed and glove ports and sample ports have been covered and sealed. The windows of the RCS and PGS have been decontaminated and left uncovered. The remaining surfaces are covered in strippable paint.

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- **Heating and ventilation system**—The H&V system has been left operating, but airflow has been turned down. Airflow and negative differential pressure levels will be determined based on actual facility conditions by Radiological Control personnel to ensure continued confinement of radioactive contamination.
- **Fire detection and suppression systems**—The dry-pipe fire detection and suppression system in the RCS is operational, but the RCS deluge, RCS carbon monoxide monitoring, and PGS fire suppression systems have been removed from service.
- **Excavator**—The excavator has been left operable and in place. Grease, loose dirt, and loose waste have been removed from the excavator arm and the arm will be in a resting position with the end-effector resting on the floor. The arm has been coated with strippable paint and wrapped in plastic sheeting. Any hydraulic fluid found from the excavator outside of the RCS has been cleaned, monitored for radiation, and the leaking area covered with clear plastic. The hydraulic system fluid has been sampled and, if determined to be radiologically contaminated, has been drained, flushed, and refilled. The fuel tank has been drained and the battery has been disconnected.

Note: Areas where hydraulic fluid spills have occurred will require frequent radiological monitoring to ensure leaking fluid does not spread contamination.

- **Compressed air tanks**—The breathing air and plant air receiver tanks have been depressurized.
- **Water tanks**—Water has been removed from the DSS and the PGS fire suppression system. The tanks are expected to be free of contamination. The valves at the RCS wall have been shut to close the potential path for contamination to the piping and water tanks.
- **Radiological monitoring**—Constant air monitors (CAMs), remote air monitors (RAMs,) personnel contamination monitors, and hand friskers remain operational although possibly reduced in number. The glovebox fissile monitors and criticality alarm system have been removed from service.
- **Weather Enclosure Structure equipment**—All other equipment in the WES (e.g., cameras, video monitors, scales, sample refrigerator, PGS power, forklifts, forklift charging station, dust control system, and the PLC control panel) have been left in place but unplugged from power.
- **Overburden soil**—Sacks of overburden continue to be stored outside the WES if a decision has been made to reuse it as overburden on OU 7-10 (above the grouted waste zone). Otherwise, the sacks of overburden soil have been sent to ICDF or RWMC for disposal or beneficial use and none remain at the facility.
- **Portable support equipment**—Most of the portable support equipment trailers remain in-place at the project site to support D&D&D operations. Exceptions include the following (if included in the project scope): the leased assay trailer, the decontamination trailer, the plant air compressor, and the PPE and shower trailer.

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3.2 Facility Layup Activities

After shutdown, the facility enters layup status until D&D&D operations begin. Initiation of D&D&D preparations is assumed to be immediate upon reaching the safe shutdown facility condition. During the layup period, the facility will be monitored to ensure radiological confinement is maintained and equipment remains safely stored. Periodic maintenance and inspection of equipment will occur as needed during layup. These tasks may be performed by Operations personnel or, alternatively, by the INEEL Inactive Site organization if the facility transition process has occurred.

The activities that will take place during layup and the equipment that requires monitoring and maintenance during this time are identified in this section.

3.2.1 Equipment and Facility Safety System Monitoring and Maintenance

Most of the equipment used during the retrieval operation will remain in the facility during layup, and either deactivated if not needed during layup or D&D&D, or left operating if needed. Equipment that must be monitored or maintained during facility layup is listed in Table 11. The expected surveillance or maintenance activities, frequency of the activity, and type of worker who will perform the activity for each piece of equipment are given in the table.

Table 11. Equipment requiring monitoring or maintenance during facility layup.

Equipment	Location	Required Action	Expected Frequency	Personnel
Excavator	WES and RCS	Check for hydraulic fluid leaks and monitor radiation levels at excavator.	Daily or monthly, depending on conditions	Operator, RCT
	WES	Check for other fluid leaks.	Monthly	Operator
Confinement	RCS walls	Take smears and air samples inside the WES, and take air samples from inside the RCS.	Weekly	RCT
	PGS glovebox walls	Take smears and air samples at the gloveboxes and drumout port areas. Radiological surveillance.	Weekly	RCT
Forklifts	WES	Check for fluid leaks.	Monthly	Operator
		Preventive maintenance.	Yearly	Maintenance technician
HEPA filters	WES	Check differential pressure.	Daily	Operator
		In-place filter test.	Yearly	HEPA test group
		Perform radiological surveys.	Weekly	RCT

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Table 11. (continued).

Equipment	Location	Required Action	Expected Frequency	Personnel
Heating and ventilation system fans	WES	Preventive maintenance.	Equipment dependent	Maintenance technician
Radiological Control equipment—constant air monitors and hand monitors	WES	Check operability.	Monthly	RCT
Fire detection and suppression systems	WES	Check operability.	Every 6 months	Operator
WES facility—general	WES	General inspections—leaks, lighting, and electrical.	Every 3 months	Operator

3.2.2 Equipment Needs During Layup

Equipment and materials needed for performance of monitoring and maintenance activities during facility layup are listed in Table 12. The operation that requires the equipment or material and the user are also given in the table.

Table 12. Equipment needs during facility layup period.

Equipment	Operation	User
Radiological survey equipment	Weekly radiological surveys	RCT
Anticontamination clothing	Weekly radiological surveys and maintenance surveys	RCT and maintenance
Tools	Preventive maintenance actions	Maintenance

3.2.3 Ending Conditions after Layup

The facility is expected to be in the same condition after layup as entering layup. If an unexpected radiological condition or equipment failure occurred, then additional decontamination or equipment maintenance may have been performed. These activities cannot be predicted at this time.

3.3 Deactivation, Decontamination, and Decommissioning Process

The D&D&D process will follow the requirements of the DOE Order 430.1 “Life Cycle Asset Management.” The overall approach to deactivating and decommissioning the project facilities is to first remove the gloveboxes and then the RCS. This will be accomplished inside temporary confinement tents

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and will eliminate the majority of the contaminants in the facility. The WES then will be removed, followed by excavation of the gravel base, and ultimately reseeded of the area. A BROKK 330 tether-controlled robot will be used to demolish the majority of contaminated equipment. The BROKK 330 is a robust, four-wheeled, electric-powered unit capable of cutting through 10-cm (4-in.) pipe. A BROKK 250 (a smaller version of the same machine) also is planned for use. The following subsections describe the individual steps required to accomplish this overall strategy.

3.3.1 Selection of Deactivation, Decontamination, and Decommissioning Approach

The Bechtel BWXT Idaho, LLC, (BBWI) project management staff will determine the approach to be used for selection of the organization that will perform the project D&D&D work scope. Currently, the two main choices are (1) on-Site Operations D&D&D personnel or (2) off-Site D&D&D subcontractors. This decision will be made during the operational phase of the project.

Using on-Site Operations D&D&D personnel will have the advantage that INEEL personnel possess previous INEEL D&D&D experience and understand the Site configuration and procedures. In addition, the INEEL has D&D&D equipment currently available for such projects (i.e., purchased for Site-wide D&D&D operations).

Using off-Site D&D&D subcontractors will incur additional costs because of the additional procurement action necessary to provide a request for proposal against which prospective prequalified and qualified D&D&D subcontractors may bid. This will require time from the Engineering and Radiological Control organizations to prepare a scope of work, radiological surveys, and other necessary characterization and project information to provide to the bidders. This also will require additional time to go through the processes for requests for proposal, bid-evaluation, and bid-award. Equipment costs also are presumed to be higher when using subcontractors.

3.3.2 Preparation of Documentation before Start of the Deactivation, Decontamination, and Decommissioning Phase

Before the start of any physical D&D&D work at the project site, specific permits, documents, and plans are required to be in place, in accordance with the PLN-1053, *Deactivation, Decontamination, and Decommissioning Project Manager's Handbook*. The handbook will be referred to for details such as form numbers and implementation of BBWI procedures for documentation, which include the following:

- Abbreviated sampling and analysis plan
- Cultural resource management requirements (from Form 451.01, "Environmental Checklist")
 - National Historic Preservation Act
 - Idaho State Historical Preservation Office
 - Advisory Council on Historic Preservation
- National Environmental Policy Act documentation (42 USC § 4321 et seq.) (from Form 451.01)

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- Categorical exclusion
- Environmental assessment
- Environmental impact statement
- Environmental assessment determination
- Project health and safety plan
- Generator treatment plan (i.e., characterization sampling)
- Characterization report and decision analysis report
- Cost and schedule preparation
 - Cost estimate (i.e., budget)
 - Integrated resource-loaded schedule
- Deactivation, decontamination, decommissioning plan
- Safety analysis and hazard classification
- Waste minimization plan
- Generator treatment plan (i.e., D&D&D work)
- Transport plan
- Organizational interface agreements (if required)
- Internal work procedures
- Notifications and requests (e.g., forms)
 - Form 450.19, "Gravel/borrow Request Form"
 - Form 432.56, "Construction Readiness Checklist – Surface Penetration/Excavation"
 - Storm water pollution prevention plan (see the D&D&D Project Manager's Handbook [PLN-1053])
 - Form 580.31, "Property Review Checklist – Tripwire," and Form 580.07, "Excess Property Report"

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- Operational readiness reviews and readiness assessments
- Work procedures and work control
- Work permits
 - Radiological work permit
 - Cutting and welding permit
 - Safe work permit
 - Special safe work permit
 - Confined space entry permit
 - Excavation permit
 - Outage request
- Air emissions calculations
- Grouting test report
- U.S. Department of Energy safety evaluation report

Project characterization will be accomplished during the waste extraction and shutdown operations. The main documents that will be required for start of the D&D&D operations phase are listed below with brief explanations:

- **Safety analysis and hazard classification** will be updated based on the physical condition of the PGS, RCS, and WES at the end of the shutdown phase and will predetermine when the facility may be reclassified
- **Health and safety plan** will be prepared to include the latest D&D&D technologies and approaches to be used on the project and the latest radiological and chemical constituents determined to be at the project site
- **Deactivation, decontamination, and decommissioning plan** will be updated to include the latest D&D&D technologies and approaches to be used on the project and the latest radiological and chemical constituents determined to be at the project site
- **Waste minimization plan** will be updated to include the latest D&D&D technologies and approaches to be used on the project and the latest radiological and chemical constituents determined to be at the project site.

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After these main documents have been completed or updated, a readiness assessment will be required by the facility manager to ensure that the selected D&D&D project team is ready to start the physical work and that all required documentation for work at the INEEL (e.g., plans, permits, requests, and notifications) have been completed and are in place as required by DOE-ID.

3.3.3 Mobilization of the Deactivation, Decontamination, and Decommissioning Project Team to the Project Site

The need to mobilize equipment and materials to the jobsite will be necessary for either selected D&D&D project team (on-Site operations or off-Site subcontractor). This mobilization is typically done after the proper documentation has been submitted (e.g., HASP and D&D&D plan) as required by the project or facility manager. The typical D&D&D project team will require the following space allocations:

- Trailer for office space
- Trailer for personnel and lunch facilities
- Trailer for clothing changes and showers
- Radiological Control trailer
- Trailer for storage of tools (i.e., hand and power) and materials
- Storage area for equipment
- Lay-down area (waste boxes) for materials
- Storage area for staging and storage of waste.

The office, personnel, lunch, change, and shower trailers will require power, water, and sewer connections that must be supplied by the RMWC facility manager or representative. If existing facilities are to be used by the D&D&D project team (e.g., existing Radiological Control trailer), these facilities need to be designated as available for use during the execution of the D&D&D phase. This mobilization must be completed and all boundaries of the work site established before the start of any physical work to ensure control of the jobsite by the D&D&D project team.

3.3.4 Reactivating the Facility and Equipment

The D&D&D project team will need to prepare the project facility for the D&D&D activities to be performed effectively. This will include establishing radiological control areas, as necessary, and reactivating many of the project systems and equipment.

3.3.4.1 Approach. The D&D&D project team will perform a walkdown of the facilities and equipment with project engineering and radiological control personnel to ensure familiarization of the physical configuration from the layup phase. The WES, or portions thereof, will be converted to a

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radiological buffer area that will later contain the temporary confinement enclosures for dismantling the facility confinement structures. Work orders will be prepared to remove lockout and tagout locks and tags from equipment that will be used during the D&D&D phase. In general, all systems and equipment will be reactivated with the exception of the deluge and water misting systems in the RCS (e.g., pit, fire suppression, and digface misting systems) because no need for these systems has been identified.

3.3.4.2 Process Description

3.3.4.2.1 Facility Walkdown and Inspection—The D&D&D project team will conduct a facility walkdown before performing detailed work order planning. This walkdown will familiarize the D&D&D personnel with the facility layout, system layup status, equipment configuration, and allow for the identification of potential hazards or worker concerns.

3.3.4.2.2 Conversion of the Weather Enclosure Structure to a Radiological Buffer Area—In preparation for the facility dismantlement, all or portions of the WES will be converted to a radiological buffer area. Appropriate signs and rope barriers will be erected by RCTs to designate these areas.

3.3.4.2.3 Reactivation of Select Weather Enclosure Structure, Retrieval Confinement Structure, and Packaging Glovebox Systems—Work orders will be prepared as needed to remove locks and tags from selected equipment and systems. Equipment and systems needed during D&D&D will be reactivated or will continue to be maintained in an operational status from layup. The affected systems and associated actions are described below:

- **Heating and ventilating system** will be brought into full operational status (this was left operational but turned down after the shutdown phase).
- **Fire protection systems** (as configured and maintained) will continue in an operational status for the layup period. (Note: the PGS subsystem, CO₂ monitoring system, and RCS deluge system will not be operational.)
- **Excavator** will be brought to full operational status. The following actions will be required:
 - Refueling
 - Preparation of the excavator arm for work (this was coated with strippable paint and wrapped in plastic during the shutdown phase)
 - Attachment of a hydraulic shear end-effector (new) to the excavator.
- **Plant and breathing-air systems** will be restarted (tanks were depressurized during the shutdown phase).
- **Radiological monitors** (e.g., RAMs, personnel contamination monitor-2s, scalars, and CAMs) not already in use will need to be put into operational status as deemed necessary by the Radiological Engineering organization.

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- **Weather Enclosure Structure lighting system** will be switched on (this was left in operational condition during layup).
- **Weather Enclosure Structure equipment** will be brought into service as required by the D&D&D project team. These are listed below:
 - Cameras and video monitors will be reactivated to enable remote operations and enhance communications during hands-on operations
 - Weigh scale will be reactivated (if scale has capacity of 5,000 kg [11,000 lb])
 - The sample refrigerator that was used during characterization sampling operations will be reactivated for post-D&D&D end-state condition verification and validation
 - Forklifts and charging stations within the WES will be reactivated during D&D&D operations.
- **Diesel generator** used for backup power in the RCS will be reactivated during D&D&D activities when the availability of electrical power is deemed critical.
- **Other ancillary equipment** will be brought into service as required by the D&D&D project team (although many equipment systems will not be needed).

3.3.5 Cutting Off Soil Probe Casings

After the initial reactivation of project facility and equipment systems, the initial work task inside the RCS will be to cut off the tops of any vertical soil probe casings at grout level in preparation for dismantlement of the shoring box.

3.3.5.1 Approach. The D&D&D operations will use the BROKK 330 in addition to power cut-off saws to cut off the soil probe casings within the waste excavation. This operation is fairly straightforward and will not require any complex support or special D&D&D techniques to accomplish. Standard radiological controls, including air monitoring and PPE, will be used throughout the process. Once cut, the current plan is to place the tops of the soil probe casings in waste boxes for disposal as LLW or MLLW rather than to bury them in the excavation area.

3.3.5.2 Process Description

3.3.5.2.1 Equipment and Material Introduction into the Confinement Area—The necessary equipment and materials (i.e., BROKK 330 with hydraulic shear, waste box, electric cut-off saws, extra blades, sand fill, and bentonite) will be brought into the RCS through the temporary airlock constructed in the WES vestibule. These items will be needed to comply with the work control documentation.

3.3.5.2.2 Install Means for Pit Access—Personnel access to the waste excavation area grout surface will require installation and securing of ladders (waste pit depth after grouting will be 1.5 m [5 ft] from the RCS steel flooring system).

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3.3.5.2.3 Cutting Off Probe Casing Tops—Workers will first unscrew and remove the probe-handling cap (i.e., flexible ball and cable assembly) from the top of a soil probe casing. The BROKK 330 will lift and place the cap in the waste box. The BROKK 330 will then hold the top of the soil probe casing while workers cut it off at grout level using the electric cutoff saw. Then the BROKK 330 will lift the removed section of probe casing and place it in the waste box. This process will be repeated until all vertical soil probe casings have been cut off.

3.3.5.2.4 Backfill and Plug Probe Casings—Workers will then backfill the open probe casings with sand, reserving the last 15 cm (6 in.) of each casing for a bentonite (i.e., clay) plug.

3.3.5.2.5 Securing Equipment—Personnel will secure equipment and materials and then exit the waste excavation area.

3.3.6 Shoring Box Dismantlement Operations

Dismantlement of the shoring box is one of the primary work tasks that must be accomplished before final backfill of the waste excavation area to finished grade and dismantlement of the PGS and RCS can be accomplished. The extent to which undercutting of the shoring box may have allowed contamination to reach the backside of the shoring box, adjacent overburden soils, and the underside of the FFS will not be completely known until the shoring box has been removed. This plan assumes that no undercutting and contamination spread has occurred.

3.3.6.1 Approach. The dismantlement of the shoring box will be one of the more challenging tasks to be accomplished by the D&D&D team and will require the use of a portable hydraulic crane. The H&V system will be operating at peak draft volume to ensure that a negative-pressure atmosphere is maintained within the RCS for confining the contamination within the RCS during the crane-access process steps. Initially, the shoring box will be sectioned (i.e., cut) into four major pieces. The crane will hold each piece in turn as it is cut from the remainder of the shoring box, from the protective skirts, and from the supporting floor structure. The crane then will lower each section to the surface of the grout backfill where it will be laid flat (with plywood and dunnage underneath). An elephant trunk (i.e., a ventilation trunk line that can be relocated) will be maintained in close proximity to the cutting operation to pull contaminated air through a portable HEPA filter and air mover. Once the shoring box has been dismantled into the four major sections and each has been lowered to the grout surface of the waste excavation area, the shoring box will be cut and sized to fit into standard waste boxes. The BROKK 330 or excavator will be used to place the sized pieces of shoring box into these waste boxes.

3.3.6.2 Process Description

3.3.6.2.1 Preparing the Weather Enclosure Structure for Crane Access—The north wall of the WES initially had a temporary opening for equipment access during the construction phase. This same opening will be used to provide access for the hydraulic crane (i.e., Grove RT52BC [28-ton, rough terrain, 4 × 4, four-wheel steering, hydraulic crane] or equivalent). The height of the crane may be too high to fit through the existing WES opening, which will require some modification to the WES doorframe system. The horizontal steel member of the frame may have to be removed and the fabric skin cut to allow crane access into the WES. The fabric skin then will be resealed and the horizontal steel doorframe member will be replaced.

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3.3.6.2.2 Moving the Crane into the Weather Enclosure Structure and Setting Up for Required Lifts—Three issues of concern must be addressed before proceeding with this work scope.

The first issue concerns the FFS floor-loading capacity. The FFS was not designed to provide support to a Grove RT52BC hydraulic crane (or similar equipment). The FFS will require placement of additional flooring beneath the path to be taken by the crane to distribute the weight to adjacent floor beams. This will require the installation of 2.5-cm (1-in.) thick steel plate panels before the crane will be allowed access.

The second issue involves the limited space between the PGS and WES for positioning the boom. It should be possible to position the crane east of the PGS and set it up with the main boom toward the center of the WES (high point).

The third issue is ventilation of diesel exhaust fumes from the crane. A temporary exhaust snorkel or similar ventilation system will be necessary to vent the diesel exhaust from the crane to the atmosphere. Otherwise, accumulation of exhaust fumes within the WES could pose a hazard to workers.

Initial review of WES and PGS physical configuration lends itself to the approach described above. However, additional research on space restrictions, positioning, and floor loading will have to be considered during the development of the detailed draft D&D&D plan to be generated before the completion of waste retrieval operations.

3.3.6.2.3 Preparing the Retrieval Confinement Structure Roof for Crane Access—The RCS roof panel(s) located above the lift point of the shoring box section will have to be removed and a flexible boot will be installed to allow the crane wire rope to pass through the boot yet allow the boot to maintain a seal around the cable (i.e., wire rope). Removal of the roof section will require radiological controls for contamination and air flow in the RCS. This flexible boot system also will have a local HEPA air-handling unit and elephant trunk installed to ensure the capture of any contamination that might get past the H&V system negative pressure drop or flexible boot. After sectioning and lowering the shoring box to the grout surface, the crane cable will be removed from the RCS, the flexible boot will be removed, the RCS roof panel will be replaced, and the HEPA air-handling unit and elephant trunk will be removed for reinstallation at the next pick location.

This process step will be repeated for the four locations corresponding to the center lifting point of each major shoring box section.

3.3.6.2.4 Sectioning the Shoring Box—Once the crane is in position and has access to the RCS through the flexible boot seal (installed previously), the crane tackle block will be attached to the section of shoring box to be sectioned. The crane will take up tension or load on the shoring box and then cutting operations will begin as listed below:

- Fireproof plywood and dunnage will be placed on the waste excavation area grout backfill to receive the section of shoring box to be removed. The BROKK 330 or excavator will be used to lower materials into the pit and position them in the pit area.

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- The shoring box section will be dismantled from its RCS floor structural supports by mechanical drilling and saw cutting or gas-torch cutting of the RCS flooring plate and RCS FFS structural steel.
- The section then will be cut from the shoring box by mechanical drilling and saw cutting or gas torch cutting of the shoring box skin plate and structural steel tubing.
- The section will be lowered onto dunnage for later sizing.

This process step will be repeated for each of the four sections of the shoring box.

3.3.6.2.5 Replacing the Retrieval Confinement Structure Roof Panel—Once the shoring box has been dismantled into four sections and lowered to the excavation pit floor, the final RCS flexible boot will be removed and the RCS roof panel will be replaced. This will ensure the containment integrity of the RCS enclosure while the shoring box is sized and loaded into waste boxes. The HEPA air-handling unit and elephant trunk will be removed for use on other tasks for the project. A temporary seal between the RCS and the floor may be required depending on final construction configuration.

3.3.6.2.6 Sizing the Shoring Box—The shoring box will be sized appropriately to fit into approved waste boxes. The shoring box is 1.7 m (5.5 ft) deep; therefore, the sizing cuts of the sections must be 1.14 m (3.75 ft) or less to fit in the approved waste box. The shoring box configuration is 10.2 × 10.2 × 0.6-cm (4 × 4 × 1/4-in.) tubing with 0.6 cm (1/4-in.) thick stainless steel plating making the section approximately 11.4 cm (4.5 in.) thick. Dimensionally, the waste boxes should each hold a stack of approximately 10 sized pieces of shoring box. The 10 pieces, each weighing approximately 297 kg (654 lb), should be well under the weight capacity of the waste box (i.e., 3,628 kg [8,000 lb]).

The shoring box sections will be sized using the BROKK 330 or excavator with hydraulic shear, drilling and sawing, or gas torch as required or allowed. If the gas torch is used, a HEPA air-handling unit with elephant trunk will be set up at the cutting face to ensure that any contamination is collected. In addition, a continuous fire watch will be established with full-time personnel (dressed in PPE) assigned to this task with appropriate 9 kg (20 lb) ABC fire extinguishers.

This process step will be repeated for all sized pieces from each of the four major sections of the shoring box.

3.3.6.2.7 Placing the Shoring Box Sections into Waste Boxes—After the shoring box has been sized for loading into waste boxes, the BROKK 330 or excavator will grip the section with the hydraulic shears or use a friction-clamping device to lift the sized sections of shoring box out of the excavation pit and place them in the waste boxes.

This process step will be repeated for each of the four major sections of the shoring box.

3.3.7 Final Backfilling of the Waste Excavation Area

3.3.7.1 Approach. After the shoring box has been removed, the remaining waste excavation area will be backfilled using approved soil fill material. This material may be new soil (e.g., obtained from the spreading area) or possibly the same overburden soil that was removed before waste retrieval operations

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began. Whichever material is selected, the fill material will be brought to the WES in bags and transferred (i.e., augured) into the RCS for remote placement and compaction by the excavator. After backfilling is complete, the fill material will be covered with a minimum of two layers of tarps to prevent contamination of the fill material during subsequent facility dismantlement.

3.3.7.2 Process Description

3.3.7.2.1 Visual Verification of Soil Subsidence—With the shoring box removed, it will be easy to assess if any soil subsidence problems have occurred within the waste excavation area. If soil subsidence has occurred, the affected area(s) can be surveyed and sampled to determine if contamination is present on the exposed overburden soil. If contamination is found, a recovery plan will be developed to manage the specific conditions.

3.3.7.2.2 Complete Backfilling Operations—Bags of approved soil fill material will be transported individually to the WES and placed outside the vestibule. Soil will be loaded into a hopper, mixed with a small amount of water, and transported by auger into the RCS. The damp soil will be dropped into the excavation at the end of the auger. The excavator will use a pneumatic compactor to spread the soil and achieve an acceptable density. No personnel will be required to enter the RCS for this operation.

3.3.7.2.3 Remove Handrails from the Retrieval Confinement Structure Facility Floor Structure—At this time it will be acceptable to remove the handrails from the RCS FFS because fall protection will no longer be an issue after the waste excavation has been backfilled. The handrails may be unbolted manually or removed using the BROKK 330 or excavator and the hydraulic shear or cut-off saw.

3.3.8 Packaging Glovebox System Dismantlement Operations

The PGS may be one of the more contaminated systems of the project, with contamination levels similar to the RCS. The PGS has a combination of contaminated and noncontaminated systems, equipment, and materials that will require segregation to achieve waste minimization.

3.3.8.1 Approach. The general approach will be to (1) decontaminate, dismantle and size the PGS equipment, (2) package materials for waste disposal, and (3) transfer waste into the RCS for packaging into waste boxes. The D&D&D of the PGS will require a temporary enclosure to be built around a glovebox to ensure no loss of contamination to the WES. The process will be repeated for the three PGS assemblies.

3.3.8.2 Process Description

3.3.8.2.1 Utility Isolation—Typical of the D&D&D of any project, system, or subsystem, all utilities associated with project, system, or subsystem will be locked and tagged-out and physically disconnected. This will be done to ensure the safety of D&D&D personnel while D&D&D operations are being performed (i.e., temporary utilities under direct control of the D&D&D team will be used instead). Affected systems are listed below:

- **Power** for overhead hoist and transfer cart systems

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- **Electrical lighting** for the PGS systems (may be left in place until D&D&D of interior equipment has been completed)
- **Fire protection** provided through the PGS fire sprinkler system
- **Heating and ventilation** HEPA filter and flow-through process (may be left in place until D&D&D of interior equipment has been completed).

3.3.8.2.2 Build Temporary Enclosure—The D&D&D team will construct a temporary enclosure around the individual PGS gloveboxes (three each, one at a time), which will minimize the size of the temporary enclosure and ensure that the spread of contamination within the WES is minimized. The typical temporary enclosure will be constructed of a wood frame structure or aluminum with multiple layers of poly sheeting. The poly sheeting will be attached to the interior of the wood frame system allowing the wood or aluminum frame to be reused for the next temporary enclosure. The poly sheeting will be used to facilitate later decontamination efforts (i.e., enable workers to strip off inner layer that should have captured most of the airborne contamination because of the static charge in the poly sheeting).

The temporary enclosure will have inlet filters installed to ensure that air inside the enclosure is filtered and flows from the temporary enclosure through an air mover and into the RCS and maintains negative airflow from the temporary enclosure to the RCS.

The temporary enclosure will have windows to facilitate remote dismantlement.

3.3.8.2.3 Removal of Interior Packaging Glovebox System Equipment—Once the temporary enclosure is in place and has been certified as acceptable, the BROKK 250 will be brought inside the temporary enclosure and D&D&D operations on the PGS can begin. The PGS interior equipment to be removed includes the following:

- Transfer cart system (carts were removed during shutdown operations to facilitate initial decontamination)
 - Cart rails
 - Screw drive rod assembly
 - Drive motor assembly
- Overhead trolley hoist system.

The drum-loading openings in the PGS floor will remain active to dispose of small size waste generated during the D&D&D process for the PGS interior equipment. The D&D&D personnel will use the existing glove ports to perform disassembly and sizing operations. Additional sizing tools may have to be transferred into the PGS before the start of work. The typical sizing tools will be electrical rotary saws (e.g., band saws) and reciprocating saws.

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The overhead trolley hoist system will be used to effect passing of the large equipment from the PGS to the RCS. The BROKK 330 in the RCS will complete this transfer. The screw drive rod assembly and last cart rails will be disconnected and passed into the RCS for sizing and placement in a waste box. The BROKK 330 in the RCS will shear the rods and rails into appropriate lengths and transfer them into a waste box. The motor assemblies will be disconnected and passed into the RCS for sizing and placement into a waste box. The BROKK 330 in the RCS will be used to transfer the sized pieces into a waste box.

The overhead trolley hoist system will be the last item dismantled because it will have been used in conjunction with the BROKK 330 to perform the transfer of equipment from the PGS to the RCS. The assembly will be cut into sections and lowered to the glovebox floor by rope or cable from the previous overhead section. The final section will be the section closest to the RCS where the BROKK 330 inside the RCS may provide assistance in lowering and transferring the final section and then hoist itself into a waste box.

The glovebox drum-loading access ports then will be sealed to ensure containment of contamination within the PGS itself.

3.3.8.2.4 Dismantlement of the Packaging Glovebox System Drum-Loading Enclosure—The PGS drum-loading enclosure will contain temporary HEPA air-handling units with the elephant trunk attached to the enclosure interior. The skirting material will be removed, vacuumed, wet-wiped, and placed in a waste box through a continuous process. Balancing of airflow will be performed to ensure proper airflow and direction throughout the WES, RCS, and PGS.

Personnel will enter the enclosure and vacuum before dismantlement of the skirting material. This should capture most of the loose contamination before dismantlement of skirting, wet wiping, and placement in a waste box. If any known breaches occurred during the drum-loading or change-out process during waste excavation operations, then this process will be handled differently. Fixants or decontamination solutions may be required if the breach was substantial.

The booted seal around the hydraulic drum-lifting assembly will be activated to the raised position to allow vacuuming and wet wiping of the boot itself and adjacent materials. Next, the boot will be removed to assess the interior mechanical assemblies for contamination. Finally, the hydraulic drum assembly will be lowered and sealed to ensure no further contamination.

3.3.8.2.5 Removal of Utilities and Access Platforms—If the exterior glovebox components are completely free of contamination at the conclusion of operations, then they may be dismantled and removed before the glovebox is enclosed in a tent. If a loop survey cannot be obtained, then the material will be disposed of as LLW.

The utilities that feed the PGS will be isolated if not previously completed (e.g., lighting and H&V) and disconnected from the PGS itself. The utilities then will be dismantled and sized for placement into waste boxes. The utilities to be isolated and disconnected are listed below:

- Power
- Lighting (cleaned and surveyed for potential reuse)

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- Fire protection
- Heating and ventilation
- Hydraulics for the drum lifting assembly.

The PGS access platforms should be free of contamination if no drum loading and unloading excursions or PGS glove port ruptures have occurred. These platforms will be disconnected from the PGS structural steel system before dismantlement and sizing for placement into waste boxes. The D&D&D team will place the BROKK 250 into the PGS tent and then use the hydraulic shears to perform sizing and handling operations. The BROKK 250 will provide the power and capability to perform the heavy and higher-risk tasks. Increased efficiencies and productivities will be achieved using this teleremote electrohydraulic demolition equipment.

3.3.8.2.6 Final Sizing of the Packaging Glovebox System—The initial PGS dismantlement operation will be to disconnect the PGS from the RCS wall. A localized containment and HEPA-supplied air-handling unit will be used for this work to further restrict the confinement area to immediate area of work. It is assumed that the 0.64-cm (1/4-in.) rolled collar sheet metal that connects the PGS to the RCS will be a bolt-and-gasket assembly that can be unbolted and a blank slipped in place and refastened. If this is not a bolted connection, the flange will have to be cut using a reciprocating saw and then a blank slipped in place and refastened. The PGS side will have only a plastic covering put in place as a temporary closure.

The BROKK 250 will be used to perform much of the disassembly and sizing operations of the PGS gloveboxes. The main PGS disassembly process will take place within the temporary enclosure and is described below:

- The D&D&D personnel enter the temporary enclosure in appropriate anti-contamination PPE and respiratory protection to partially dismantle the window panels from the frames using hand tools. Remote dismantlement using the BROKK 250 would not be effective because of the use of high-strength laminated glass in the lower window locations. Manual dismantlement will continue until the window panels are almost free but are still held in place by the frame at a minimum of two points (e.g., one on top and one on bottom). However, dismantlement must be sufficient to ensure that the BROKK 250 is capable of breaking the remaining connections that hold the panels in place.
- Suspend the glovebox load, using the Grove RT52BC crane (or equivalent), while the BROKK 250 is used to shear, remove, and place the support steel in waste boxes. The temporary enclosure roof panel(s) located above the lift point of the PGS will have to be removed and a flexible boot installed to allow the crane wire rope to pass through the boot yet allow the boot to maintain a seal around the cable (i.e., wire rope). This flexible boot system also will have a local HEPA air-handling unit and elephant trunk installed to ensure the capture of any contamination that may escape the H&V system negative pressure drop or flexible boot.
- Lower the glovebox assembly to the WES floor and place it on its side using the Grove RT52BC crane.

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- Break the remaining window panel frame connections using the BROKK 250 and place panels into soft-sided bags (some panels will be too large to fit into standard waste boxes).
- Remove the structural steel tubing from the glovebox using the BROKK 250 and shear into sections and place sections in waste boxes.
- Smash the glovebox interior 11-gauge stainless steel sheet metal flat by using the BROKK 250.
- Size the smashed 11-gauge stainless steel sheet metal using the BROKK 250 shears and place in waste boxes.

Note: A potential problem could occur if the 11-gauge stainless steel sheet metal becomes bound up and entangled around the hydraulic shear of the BROKK 250. This would require handwork to fix and creates a potential for personnel injury. Injury will be mitigated by using reach tools and stainless steel or Kenlan-lined gloves.

3.3.8.2.7 Packaging the Packaging Glovebox System into Waste Boxes—The PGS assembly will be placed into various waste boxes depending on the types and levels of contamination. Possible waste types and required segregation of material and waste are listed below:

- Exterior structural steel, LLW
- Interior 11-gauge stainless steel sheet metal, LLW.

If material is surveyed as clean, then it will be disposed of as industrial waste.

Approved waste boxes will be used for these waste packaging operations. Care must be taken to ensure proper sorting and segregation of waste streams in accordance with the approved waste minimization plan.

3.3.8.2.8 Decontamination of Area and Removal of the Temporary Enclosure—The internal layer of poly sheeting will be removed from the ceiling and walls and placed in the waste box. The floors will be vacuumed to remove most loose contamination. The areas then will be wet wiped to remove any additional loose contamination. Radiological Control personnel will perform a radiological survey of the temporary enclosure to ensure a clean configuration. If any radiological contamination is detected, that specific area will be marked for additional decontamination efforts until released by Radiological Control.

The temporary enclosure will be disassembled in reverse order of construction to ensure structural integrity (i.e., walls, trusses, and doorways) for reuse on the next PGS. The process steps identified in Section 3.3.8 will be repeated for the two remaining gloveboxes.

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3.3.9 Retrieval Confinement Structure Dismantlement Operations

3.3.9.1 Approach. A temporary enclosure will be built around the RCS to allow the entire structure to be dismantled while maintaining containment of radiological contamination. A BROKK 330 will already be inside the RCS and will be used to dismantle the interior.

3.3.9.2 Process Description

3.3.9.2.1 Building of Temporary Enclosures and High-Efficiency Particulate Air System for Dismantlement Phase—A large enclosure will be built around the RCS. The enclosure will feature multilayered plastic to aid in final decontamination and removal of the enclosure. A temporary HEPA ventilation unit will be installed (the main ventilation unit will be shut down for dismantlement) to provide continuous off-gas flow and filtration during dismantlement.

3.3.9.2.2 Removal of Interior Retrieval Confinement Structure Equipment (Excavator Arm)—The excavator arm will be decontaminated by wiping down any visible loose dust. The arm will be wrapped with plastic, disconnected from the excavator, and packaged as LLW. The arm will be hoisted, similar to the shoring box dismantlement operation.

3.3.9.2.3 Removal of Utilities—After utility isolation, the BROKK 330 will demolish the interior equipment such as sprinklers, HEPA, H&V dampers, and deluge components. The waste will be loaded into waste boxes for disposal as LLW.

3.3.9.2.4 Removal of the Main High-Efficiency Particulate Air Unit and Filters—The main HEPA filter bank will be removed and disposed of as TRU or MTRU waste. An additional enclosure may be required around the HEPA enclosure to minimize the spread of contamination.

3.3.9.2.5 Final Sizing of the Retrieval Confinement Structure Operations—A final decontamination of the RCS interior may be required before its dismantlement. The BROKK 330 then will be used to remove side panels and to dismantle and size the support steel. The entire dismantlement should be accomplished with very few personnel entries into the RCS. The BROKK 330 will perform almost all activities remotely. Personnel entries would only be required to perform maintenance on the BROKK 330 and minor sizing.

3.3.9.2.6 Final Sizing Operations for the Retrieval Confinement Structure Facility Floor Structure—The BROKK 330 will be used to size the decking material. Some personnel entries may be required to cut portions with a torch if the BROKK 330 cannot attain all configurations. This will be unlikely.

3.3.9.2.7 Packaging the Retrieval Confinement Structure into Waste Boxes—During the dismantlement of the RCS and its components, the waste will be sized and packaged into waste containers. The majority of the waste will be classified as LLW. Because of the high density of the steel components, and previous decontamination efforts, no TRU waste is anticipated. Loaded waste containers will be moved out of the RCS as they are filled and staged in a temporary storage location until shipment to the ICDF.

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3.3.10 Deactivation, Decontamination, and Decommissioning of Equipment

3.3.10.1 Approach. Equipment (e.g., the BROKKs 330 and 250) must be decontaminated on completion of the D&D&D of the facility. The existing tent used to contain the RCS will be used to contain contamination during decontamination of the equipment.

3.3.10.2 Process Description. The equipment dispositions as discussed below are based on expected residual contamination on identified equipment. However, should the contamination be higher than acceptable levels, additional decontamination or alternate disposition may be required.

3.3.10.2.1 CAT 446B Excavator Hydraulic Systems—The hydraulic systems will be drained on the CAT 446B excavator. The fluid will be sampled for radioactive contamination and disposed of in accordance with INEEL company procedures.

3.3.10.2.2 CAT 446B Excavator Equipment Decontamination—The CAT 446B excavator will be wiped down. Contaminated grease will be removed using small volumes of detergent solution. This equipment will not be free released, but all surface contamination can be removed.

3.3.10.2.3 CAT 446B Excavator Equipment Readiness—If reuse is a potential for the CAT 446B excavator, it will be reassembled including hydraulics, outriggers, and wheels. The equipment will be released from the job site for radiological use at other on-Site D&D&D jobs. If no further use for the equipment is required, the equipment will be packaged for LLW disposal.

3.3.10.2.4 BROKK 330 and 250 Hydraulic Systems—The BROKK 330 and 250 hydraulic systems will be drained and the fluids sampled for radioactive contamination. The fluids will be disposed of in accordance with INEEL company procedures.

3.3.10.2.5 BROKK 330 and 250 Equipment Decontamination—The BROKK 330 and 250 will be decontaminated using a wet wipe-down method. Contaminated grease will be removed using small volumes of detergent solution. This equipment will not be free released but all surface contamination can be removed. Some contamination will likely remain in the seals but the equipment can still be reused for radiological work at the INEEL.

3.3.10.2.6 BROKK 330 and 250 Equipment Readiness—The BROKK 330 and 250 will be reused on other INEEL D&D&D jobs. They will be packaged for movement to another part of the INEEL Site pending reuse.

3.3.10.2.7 Dismantlement of the Temporary Enclosures—The temporary enclosure tents will be decontaminated. An extra layer of plastic will be included in the temporary enclosure tents during the erection phase. This will allow for quick removal of any interior contamination. After decontamination has been completed, the temporary enclosure tents will be demolished and removed as LLW.

3.3.10.2.8 Dismantlement of the Temporary High-Efficiency Particulate Air System—The temporary HEPA system will be decontaminated and dismantled and prepared for reuse on future INEEL projects.

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3.3.11 Dismantlement of the Weather Enclosure Structure

3.3.11.1 Approach. The WES should be free of contamination at the conclusion of the RCS removal. Any small contaminated spots will be decontaminated and removed. All utilities must be removed before the entire structure is dismantled.

3.3.11.2 Process Description

3.3.11.2.1 Removal of the Interior Equipment Systems—The water and air tanks will be removed and disposed of as clean waste in the CFA landfill. All electrical components, including control panels, distribution panels, and lighting will be removed and disposed of in the CFA landfill. All items removed require radiological control survey.

3.3.11.2.2 Removal of the Exterior Equipment Systems—The exhaust ductwork outside the WES will be wrapped in plastic, dismantled, sized as needed, and placed in approved waste boxes. The stack and fans will be wrapped in plastic, dismantled, and disposed of as indicated in Table 1. After removal, the electric fan motors can likely be reused within the INEEL.

3.3.11.2.3 Removal of Interior Structures—The transfer vestibule and personnel access structures will be dismantled. Lockers and storage cabinets will be removed.

3.3.11.2.4 Removal of Interior Utility Systems—The firewater and plant air systems will be removed. Various alarms, instrumentation, and camera systems will be removed.

3.3.11.2.5 Radiological Control Final Survey of the Weather Enclosure Structure—A final survey will be performed by Radiological Control personnel before the exterior of the WES is breached.

3.3.11.2.6 Spot Decontamination (if Necessary)—Any contamination identified will be decontaminated. If the contamination cannot be removed, it will be fixed and the hot spot cut out and disposed of as LLW.

3.3.11.2.7 Removal of the Interior Facility Floor System—The floor will be dismantled with a trackhoe-mounted shear. Cutting torches also will be required to size the floor structural members. Materials will be surveyed, sized, and packaged as industrial waste for the CFA landfill.

3.3.11.2.8 Removal of the Fabric Enclosure System—The fasteners and internal cabling system will be dismantled, allowing removal of the fabric from the WES. The fabric will be divided into a minimum of three sections, folded, and stored for reuse. This activity will be performed only when the wind speed is less than 5 miles per hour.

3.3.11.2.9 Removal of the Weather Enclosure Structure Structural Framing—The structural framing will be unbolted piece-by-piece and disassembled. The steel members will be stored with the fabric at a secure site. Reuse of the building will be sought within the DOE complex system.

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3.3.11.2.10 Removal of the Weather Enclosure Structure Final Facility Floor Structure Perimeter—The FFS perimeter will be dismantled with the shearing end effector. Some gas-torch cutting also will be required.

3.3.12 Restoration of the Project Site

3.3.12.1 Approach. After fulfilling the dismantlement requirements of the D&D&D plan, the project area will be returned to its preretrieval state.

3.3.12.2 Process Description

3.3.12.2.1 Deactivation, Decontamination, and Decommissioning of Site Utilities—After energy isolation, the site utilities will be removed, including power lines and firewater lines. The project manager will ensure that the breakers and valves used as isolation points are agreed to with the RWMC facility manager.

3.3.12.2.2 Removal of Ancillary Temporary Facilities—The breathing air, shower, and polychlorinated biphenyls (PCB) storage trailers (if used) will be removed and excessed and all utilities supporting these trailers will be removed.

3.3.12.2.3 Remediation of Graveled Areas—Gravel laid down as part of roads, parking areas, lay-down areas, and the base of the WES will be removed and hauled to the bottom of the SDA for use as base material. The gravel will be spread and compacted on the ramp leading into the SDA and the floor of the SDA to provide improved roadbed.

3.3.12.2.4 Remediation of Grounds—Clean topsoil will be placed over disturbed areas and reseeded will be performed.

3.3.12.2.5 Demobilization—All D&D&D support trailers and equipment will be removed as part of the project site demobilization.

3.3.13 Equipment and Facility Requirements during Deactivation, Decontamination, and Decommissioning Operations

The equipment and facility requirements for the D&D&D team are discussed briefly in the following paragraphs.

Major equipment requirements include the following:

- BROKK 330—recommended to be purchased as part of this project
- CAT 446B—to be purchased as part of this project
- BROKK 250—INEEL Operations D&D&D group-owned equipment
- Grove RT52BC crane—INEEL Operations D&D&D group-owned equipment

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- GEHL Forklift—INEEL Operations D&D&D group-owned equipment
- Truck tractor and flatbed trailers—INEEL Operations D&D&D group-owned equipment
- CASE 921C loader—INEEL Operations D&D&D group-owned equipment
- Motor grader—INEEL-owned equipment
- Hydro seeder—INEEL Operations D&D&D group-owned equipment
- Tandem dump truck (12 yd³)—INEEL Operations D&D&D group-owned equipment
- Twelve-passenger van
- Crew cab 3/4-ton pickup truck.

Power, water, sewer, and other project facilities requirements are identified below:

- One office trailer, 3.7 × 12.2 m (12 × 40 ft) (power)
- One personnel trailer, 3.7 × 12.2 m (12 × 40 ft) (power)
- One change and shower trailer, 3.7 × 12.2 m (12 × 40 ft) (power, water, and sewer)
- Two materials and tool trailers, 3.7 × 12.2 m (12 × 40 ft) (power drop trailer)
 - These trailers will stock standard electrical power tools and hand tools such as the following:
 - Band saws, reciprocating saws, drills, and power chisels
 - Pneumatic impact hammers and wrenches
 - Hand tools, wrenches, hammers, and gas torches
 - These trailers also will stock standard D&D&D materials such as those listed below:
 - Strippable paint, wet-wipe solutions, grease, lubricants, and oils
 - Duct tape, bolts, nails, lumber, poly sheeting, and cotton rags
 - High-efficiency particulate air-handling units, elephant trunk, and HEPA filters
 - Electrical extension chords, ground fault interrupt outlets, lighting, and heating
 - Personal protective equipment: gloves, booties, cloth and Tyvek coveralls, respirators, filters, bubble suits, and air hoses.

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3.3.14 Interfaces

Interfaces with INEEL Site facilities and managers and the D&D&D team will be minimal because of the project isolation and location. The main interfaces are listed below:

- Project manager or designated representative will interface with the following:
 - Project operations
 - Facility operations
 - Site property management (e.g., excess property)
 - Interface with ICDF about waste disposal
 - Interface with the AMWTP about waste disposal
- RWMC site area director or designated representative will be the interface in the following areas:
 - Site utilities
 - Site restoration
 - RWMC LLW pits (waste interface)
- Site security personnel will be the interface for the following areas:
 - Badging
 - Physical security
 - Physical access to the project site.

3.3.15 End State after the Deactivation, Decontamination, and Decommissioning Phase

The end-state criteria for the D&D&D operations were discussed in Section 2.3.2, which outlines the end state for all facilities, equipment, materials, and site areas associated with this project.

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4. MATERIAL AND EQUIPMENT IDENTIFICATION AND DISPOSITION PATHS

Table 1 lists the equipment and structures used in the retrieval demonstration portion of the project, the expected waste category after use, and the planned final disposition location. This table is a distillation of Appendix A of the Project Waste Management Plan (INEEL 2002c), which is the governing document for disposition of materials from the project. Table 1 shows only the equipment and structures used in the excavation and the handling of this material through final disposition. Other waste materials created during the shutdown, layup and D&D&D phases of the project are covered in the Project Waste Management Plan (INEEL 2002c).

Radiologically contaminated equipment and structures used for the OU 7-10 retrieval demonstration project will be sent to the ICDF for disposal when practical. Although it is assumed that a portion of the materials may not be readily decontaminated to below 10 nCi/g of TRU contamination and will require treatment and disposal at the AMWTP, this is not the primary disposition path and is not shown in the table.

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5. WASTE GENERATION ESTIMATES

Waste generation estimates for the project from construction through final D&D&D operations are given in the Project Waste Management Plan (INEEL 2002c). Below is a summary of the waste generation estimates for the facility shutdown, layup, and D&D&D phases:

- AMWTP (TRU and MTRU waste) = 130 yd³
- Idaho National Engineering and Environmental Laboratory CERCLA Disposal Facility (LLW and MLLW) = 350 yd³
- Idaho National Engineering and Environmental Laboratory landfill (industrial waste) = 150 yd³
- Total waste generated during shutdown, layup, and D&D&D phases = 630 yd³.

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6. SCHEDULE

A timeline has been developed and included as Figure 9. This timeline is preliminary only and represents a rough order of magnitude estimate of the durations involved in performing the facility shutdown and D&D&D activities as described in this plan. The timeline has been provided for information only and is not suitable for use in establishing project milestones or for cost estimation. It represents an aggressive schedule in that both shutdown and D&D&D activities are based on double shift operations. This reflects BBWI and DOE-ID desires to complete all fieldwork for the project as early as possible.

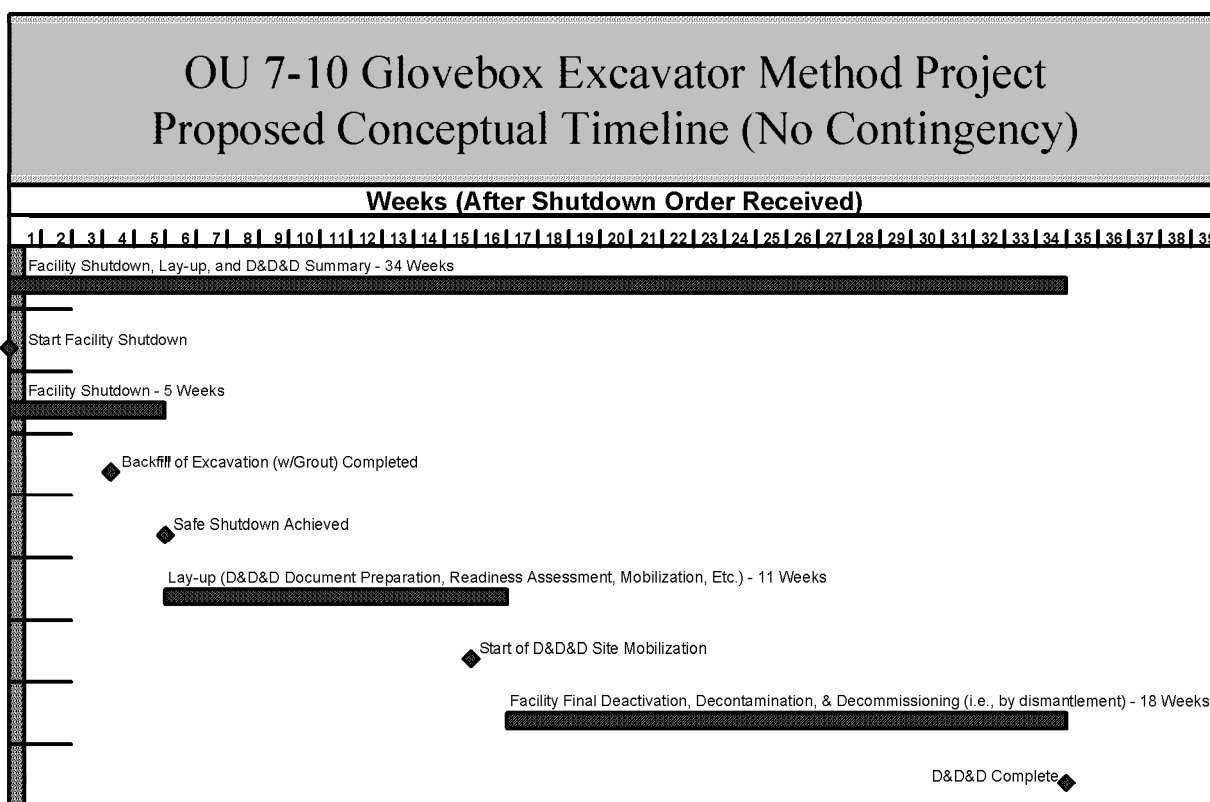


Figure 9. Timeline for performing the OU 7-10 Glovebox Excavation Method Project facility shutdown and deactivation, decontamination, and decommissioning activities.

Caveats to this timeline are listed below:

- The scope of activities is based on the conceptual design and not on an actual facility.
- The facility contamination levels and the capabilities of the DSS are currently estimated, and not known. Also unknown is the behavior of the contaminants in the waste to be excavated. Durations are based on the areas within confinement having a median contamination level (i.e., approximately 1×10^6 dpm per 100 cm²) relative to the full range of reasonable values

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(between 1×10^4 dpm per 100 cm² and 1×10^7 dpm per 100 cm²) and also on contamination having a limited mobility (i.e., contamination spread is minimal where [1] no activities are conducted that may disturb the exposed waste materials and [2] more than air circulation alone is required to spread the contamination). Actual conditions present when retrieval and sampling operations are complete may be significantly better or worse than those used as a basis for this timeline. Therefore, the actual duration for the above phases may be significantly less or greater than that shown. Furthermore, significantly different contamination states may cause the selected shutdown and D&D&D approaches to change altogether (e.g., fully remote operations may be required in the presence of extremely high contamination such as 1×10^7 dpm per 100 cm²).

- Activity durations developed for this timeline contain no contingency for rework, unexpected conditions, or other delays.
- No holidays are included in the resource calendars, and work shifts and schedules are as stated in the assumptions contained in Section 2.1.

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7. PROJECT ASSESSMENTS

This section identifies project assessments that could impact the processes, equipment, and ending conditions selected for facility shutdown, layup, and D&D&D phases. This section also provides summaries of results, recommendations, and requirements, if applicable, that are contained in these assessments.

7.1 Safety Classification and Category

7.1.1 Hazard Analysis and Classification

A final documented safety analysis document is being prepared to update the *Preliminary Documented Safety Analysis for the OU 7-10 Glovebox Excavator Method Project* (INEEL 2002e). This final documented safety analysis will include discussion on the post-retrieval life-cycle phases and may allow a change in the facility hazard classification based on changing hazard conditions. Table 13 summarizes the results of a preliminary evaluation to forecast facility hazard classifications across the project life-cycle phases based on assumptions documented in Section 2.1. Table 14 predicts the operating status of major structures, systems, and components (SSCs) based on these same assumptions.

Table 13. Safety analysis evolutions during the project facility life-cycle phases.

Project Phase Hazard Category	Over-burden Removal	Waste Zone Material Processing	Under-burden Sampling	Initial Decontamination (prepare for pit grouting)	Pit Grouting	Layup	Deactivation, Decontamination, and Dismantlement		
							New Over-burden	Final Decontamination	Dismantlement
Hazard Category 2—Documented Safety Analysis (DSA)	E	E	E	E	E	NE	NE	NE	NE
Hazard Category 3—DSA	NE	NE	NE	NE	NE	E	E	E	NE
Radiological Low—Auditable Safety Analysis	NE	NE	NE	NE	NE	NE	NE	NE	P
Other Industrial—No additional safety analysis required	NE	NE	NE	NE	NE	NE	NE	NE	P
Legend:	Expected (E)			Possible (P)			Not expected (NE)		

As shown in Table 13, several potential safety analysis evolutions could occur during the various life-cycle phases of the project facility. These include (1) documented safety analyses (DSAs) (used for both Category 2 and 3 nuclear facilities), (2) an auditable safety analysis (used for low hazard radiological facilities), and (3) no additional safety analysis required (used for ordinary industrial facilities). The level of required safety analysis can be reduced as the potentially releasable radiological and hazardous

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inventories are reduced or when criticality is no longer possible. Once the project is classified as low radiological, the DSA, technical safety requirement (TSR), and unreviewed safety question requirements of 10 CFR 830, Subpart B, "Safety Basis Requirements," are no longer applicable. However, the project still will be subject to Price Anderson Amendment Act requirements for nuclear facilities.

Table 14. Forecasted operating status of major project structures, systems, and components by facility life-cycle phase.

Project Phase Structures, Systems, and Components	Over-burden Removal	Waste Zone Material Processing	Under-burden Sampling	Initial Decontamination (preparation for pit grouting)	Pit Grouting	Layup	Deactivation, Decontamination, and Dismantlement		
							New Over-burden	Final Decontamination	Dismantlement
WES	R	R	R	R	R	R	R	R	NR
RCS	R	R	R	R	R	R	R	R	NR
PGS	R	R	R	R	R	R	R	R	NR
Excavator	R	R	R	R	R	R	R	R	MBR
WES, RCS, and PGS ventilation	R	R	R	R	R	R	R	R	MBR
Drum-out ventilation	MBR	R	MBR	MBR	NR	NR	NR	MBR	NR
Dust suppression	R	R	R	R	R	MBR	MBR	NR	NR
RCS deluge	NR	R	R	R	R	NR	NR	NR	NR
RCS dry-pipe	R	R	R	R	R	MBR	NR	NR	NR
RCS carbon monoxide monitor	NR	R	R	R	R	NR	NR	NR	NR
PGS fire protection system	NR	R	MBR	MBR	NR	NR	NR	MBR	NR
WES dry-pipe	R	R	R	R	R	R	R	R	NR
WES fire alarm system	R	R	R	R	R	R	R	R	NR
Constant air monitors and remote air monitors	R	R	R	R	R	R	R	R	MBR
Criticality alarm system	NR	R	NR	NR	NR	NR	NR	NR	NR
Stack monitoring	NR	R	R	R	R	R	R	R	NR

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Table 14. (continued).

Project Phase Structures, Systems, and Components	Over- burden Removal	Waste Zone Material Processing	Under- burden Sampling	Initial Decon- tamination (preparation for pit grouting)	Pit Grouting	Layup	Deactivation, Decontamination, and Dismantlement		
							New Over- burden	Final Decon- tamination	Dismantle- ment
Primary electrical	R	R	R	R	R	R	R	R	NR
Standby electrical	NR	R	R	R	R	R	R	R	NR
Breathing air	NR	R	R	R	R	NR	R	R	NR
Legend:	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 10px; background-color: #add8e6; border: 1px solid black; margin-right: 5px;"></div> Required (R) </div> <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 10px; background-color: #ff8c00; border: 1px solid black; margin-right: 5px;"></div> May be required (MBR) </div> <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 10px; background-color: #ffffff; border: 1px solid black; margin-right: 5px;"></div> Not required (NR) </div> </div>								

7.1.1.1 Confinement Systems. The WES, RCS, and PGS will be needed up to the D&D&D phase. Because of the construction sequence and design, if the RCS is required, the excavator, the WES, and the PGS must be in place as well. Therefore, for an activity like overburden removal, all three structures will be in place even though all three may not be required for safety reasons. The RCS and PGS ventilation system may be needed during dismantlement. The drumout ventilation system may be needed during overburden removal if overburden is used during cold runs through the gloveboxes for operator training and qualification. The drumout ventilation system may be needed during underburden sampling if the samples are to be passed through the PGS and then the drumout ports. The drumout ventilation system also may be needed during the initial and possibly the final facility decontamination if the drumout area has been contaminated, or if decontamination materials are to be passed through the PGS for packaging in the drum loadout enclosure.

7.1.1.2 Excavator. The excavator will likely be needed during all operations involving retrieval and grouting operations. Although it will not likely be needed for layup, it may be needed for new overburden placement, decontamination activities, and possibly for dismantlement.

7.1.1.3 Dust suppression system. The DSS will be needed during overburden removal, waste zone material processing, underburden sampling, and for pit grouting. It likely will not be needed during the other life-cycle activities because the pit will have been grouted or the life-cycle activity will not involve activities in the pit (e.g., layup). A need for dust suppression may exist during the installation of new overburden depending on the delivery method (e.g., sacks vs. soil grout).

7.1.1.4 Fire Protection Systems. To ensure that the risk of potential facility losses are acceptable, the WES dry pipe and fire alarm systems are required for all life cycles up to dismantlement. The RCS deluge and CO monitoring systems are for subsurface fires only. Therefore, these systems are required only as long as the retrieval pit is open. They are not needed after pit grouting. The RCS dry-pipe system will be required through pit grouting and may be required during the layup period. The PGS fire protection system would be required whenever waste or sample-handling operations are being performed in the gloveboxes. Therefore, the PGS system would be required for waste zone material processing and

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underburden sampling if the samples are processed through the PGS, or if drums of decontamination waste are passed through the PGS for overpacking.

7.1.1.5 Radiological Instruments. To ensure notifications of potential release or exposure incidents, CAMs and RAMs would be required as long as the potential for a radiological hazard exists in the facility. Therefore, they may be required up through dismantlement. Criticality scenarios are possible only as long as waste is being packaged; therefore, the criticality alarm system is needed only during the waste zone material processing cycle. To ensure potential releases are monitored, stack monitoring would likely be required after the overburden has been removed and for all other facility life cycles through the final decontamination phase.

7.1.1.6 Electrical. Primary and standby electrical power would be needed as long as the ventilation and CAM and RAM systems are needed. Therefore, they are needed up to the dismantlement phase.

7.1.1.7 Breathing Air. The breathing air system would likely be required after the overburden is removed for any personnel entries into the RCS before final decontamination. Workers likely will be in filtered respirators during overburden removal and entries into the RCS will not be needed during the layup period. Worker entries will be required during initial decontamination, pit grouting, new overburden placement and final decontamination.

7.1.2 Safety Category

The safety category of SSCs may change after reaching the post-retrieval life-cycle phases discussed in this plan based on updates to or supersession of the DSA. Changes in safety category for the various project SSCs have not been forecasted at this time. However, such changes could affect detailed plans for maintenance actions (e.g., repairs) during the layup period.

7.2 Health and Safety

The OU 7-10 Glovebox Excavator Method project is preparing a HASP with more details on implementation of INEEL Manual 14A (Safety and Health – Occupational Safety and Fire Protection) and Manual 14B (Safety and Health – Occupational Medical and Industrial Hygiene). This HASP will cover operations up through the D&D&D phase of the project, including waste retrieval operations, underburden sampling, shutdown operations, and facility layup. A separate HASP will be prepared for D&D&D operations and will be discussed in the final D&D&D Plan. Both HASPs will cover appropriate safety measures based on assessed hazards including industrial, radiological, and fire safety hazards.

This plan has been prepared with input from project radiological and industrial safety personnel. This input included a suggestion for a slightly modified shutdown approach. Deadlines associated with the preparation of this plan precluded a thorough analysis and comparison of this alternative with the method described herein. This alternate approach is discussed in Appendix B to this plan. If time and project funding allow, it may be advisable to perform a value engineering or trade-off analysis before the preparation of detail plans and procedures for shutdown to determine the superior approach.

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7.3 Safeguards and Security

Videotape footage of the retrieval and packaging operations will be taken to identify classified materials and items in case they are encountered during the retrieval demonstration. These materials and items will not meet waste acceptance criteria for AMWTP Facility. Before the initiation of shutdown operations, appropriate security personnel must review the videotapes and verify that no classified materials and items were packaged into the waste drums. The duration of this review is expected to be less than 1 week at which time all drums should be dispositioned based on the review findings. Delays in completing the necessary reviews may delay the start of shutdown operations. The review of tapes will be performed by the Classified and Sensitive Unclassified Information Office using PLN-632, "Operable Unit 7-10 Staged Interim Action Project Physical Security Plan." A contingency plan will soon be written to address classified or sensitive items in case they are encountered.

Normal RWMC access and security requirements will apply during post-retrieval project phases. No other safeguards and security impacts are anticipated for these phases of the project.

7.4 Emergency Preparedness

Emergency preparedness activities for all OU 7-10 Glovebox Excavator Method project operations will be covered in the Addendum 3 of PLN-114, "INEEL Emergency Plan/RCRA Contingency Plan." This plan is updated annually to include new operations. This Facility Shutdown Plan and D&D&D Pre-Plan document and the final D&D&D Plan will be used to update PLN-114.

7.5 Risk Management

Table 15 identifies risk items from the Project Risk Management Plan (INEEL 2002d) that have the potential to impact assumptions, conditions, plans, or estimates contained in this plan. Monitoring of risk response plan activities for these risk items throughout their execution may provide early indications of impacts to this plan. Because of the anticipated short interval between start of waste retrieval and start of shutdown, early detection of impacts to this plan is especially important to increase the time available for impact recovery and resolution.

Table 15. Risk items that may impact facility life-cycle phases.

Risk Tracking Number ^a	Risk ^b	Managed Action Level	Comments
O23	Loss of ventilation flow occurs, increasing the risk of contamination release into the WES.	High ^c	d
O25	Noncatastrophic glovebox glove leak or failure occurs.	High ^c	e
O26	Catastrophic leaking or glovebox failure occurs.	High ^c	e
O2	Fire occurs in confinement area involving waste materials.	High ^c	d

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Table 15. (continued).

Risk Tracking Number ^a	Risk ^b	Managed Action Level	Comments
S/R1	Excavator operation causes fire and personnel exposure.	High ^c	e
O35	Operator punctures glove by using tool or handling cart improperly causing breach of confinement.	Moderate	e
O34	Operator pulls off or cuts hole in bag causing breach of confinement.	Moderate	e
O22	Operator bumps transfer cart support with excavator boom, and support breaks away from wall causing breach of confinement.	Moderate	e
O31	Operator drops load from transport equipment causing breach of confinement.	Moderate	e
O33	Operator does not properly connect drum interfaces causing breach of confinement.	Moderate	e
O19	Probe is dropped by excavator and breaches the RCS.	Moderate	e
O28	Contamination is spread into WES from RCS, and additional safety measures affect cost and schedule.	Moderate ^e	d
O30	Operator loses control of transport equipment, causing breach of confinement.	Moderate ^e	e
O32	Operator unintentionally engages boom controls and boom hits RCS.	Moderate ^e	e
E/R5	AMWTP will not accept waste without characterization. Project requires storage.	Low	f
O21	Pit is flooded with water from run-on from rainfall or pipe leak. Work is delayed and costs increase.	Low	d

Note: This table is grouped by the managed action levels of the risks: high, moderate, and low (highlighted in orange, yellow, and green, respectively).

a. Categories: D/C = design and construction E/R = environment and regulatory O = operations
P/C = procurement and contract P = programmatic R = resources
S/R = safety and radiological health

b. The risk analysis worksheets in Appendix C of the *Risk Management Plan for the OU 7-10 Glovebox Excavator Method Project* (INEEL 2002d) contain complete details and proper context.

c. Low-level risk, but moderate-level risk management action plan will be used.

d. A loss of confinement would likely invalidate assumptions about the WES (including enclosed systems), the FFS (excluding the shoring box), and overburden soils having no detectable contamination from project waste retrieval operations.

e. A breach in confinement would likely invalidate assumptions about the WES (including enclosed systems), the FFS (excluding the shoring box), and overburden soils having no detectable contamination from project waste retrieval operations.

f. Risk could result in the reinstatement of the storage building into the project baseline. This would increase the scope of deactivation, decontamination, and decommissioning activities.

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7.6 Configuration Management – Changes since the Conceptual Design Report

This section identifies project baseline changes since the submittal of the OU 7-10 Glovebox Excavator Method Project CDR (INEEL 2002b) that affect assumptions, conditions, plans, and estimates associated with post-retrieval facility life-cycle phases.

7.6.1 Closure Process

The term “closure” was replaced with “shutdown.” “Closure” has a regulatory meaning that was not intended.

7.6.2 Underburden Sampling

Sampling of the underburden has been redefined as part of retrieval operations rather than a shutdown activity.

7.6.3 Soil Fixative in Pit

To prevent the need for personnel entry to spray a soil fixative in the open pit, the water spray from the DSS is used to control contamination. This spray will be turned on as needed to control contamination from the open pit.

7.6.4 Overburden Disposal

The operation of returning the overburden soil to the waste zone of the pit after retrieval operations is more complex than was justified. As a result, the cost of returning the overburden to the pit is significantly higher than backfilling the waste zone with a clean loose (i.e., weak) grout mixture. The analysis and decision to backfill the pit with loose grout and alternative for the final disposition of the overburden soil is documented in “Evaluation of Overburden Soil Characterization Information and Disposal Options for the Glovebox Excavator Method Project (Operable Unit 7-10) (Draft).”^f

7.6.5 Overburden Trench Box (Shoring Box)

The shoring box will not be left in place as was stated in the CDR (see footnote f). This change is to satisfy RWMC and Radiological Control requirements for maintaining a clean protective soil cover over the waste having a depth of 1 to 1.5 m (3 to 5 ft). The shoring box will instead be removed during the D&D&D phase of the project.

f. Burton, Brent N., 2002, “Evaluation of Overburden Soil Characterization Information and Disposal Options for the Glovebox Excavator Method Project (Operable Unit 7-10) (Draft),” Engineering Design File EDF-2161, Rev. A., Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

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7.7 Quality Assurance

No quality assurance impacts to this plan are anticipated. However, quality assurance will need to be addressed relative to sampling and analysis for initial facility and waste characterizations and for verification that end-state criteria (see definition) have been met. Specific end-state criteria for this project will be developed and documented in the final D&D&D plan.

7.8 Environmental

This section identifies environmental assessments that define or impact assumptions, expected conditions, actual conditions, plans, or estimates associated with post-retrieval facility life-cycle phases.

7.8.1 Project Waste Management Plan

The Waste Management Plan (INEEL 2002c) is the governing document on all waste generated by the OU 7-10 Glovebox Excavator Method Project. The Waste Management Plan and this plan were prepared jointly and information has been shared and coordinated. During preparation of the final D&D&D plan, when additional information will be available, the waste generation tables in the Waste Management Plan will require updating.

7.8.2 Air Emissions Evaluations

Currently, the air emissions evaluations address only the retrieval phase of the project (Abbott 2002). Information provided in this plan may be used to update the air emissions evaluation to include the facility shutdown, layup and D&D&D phases of the project. Also, results of this update may impact the identified SSCs required to be operational during these phases (e.g., stack monitoring system).

7.8.3 Applicable or Relevant and Appropriate Requirements

Regulatory requirements have been identified in this document as reviewed by project environmental personnel. However, this plan does not include a complete regulatory analysis for implementing these requirements. An engineering design file (EDF) is being prepared by project environmental personnel to more completely address the impact of ARARs on this project.

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8. REFERENCES

- 10 CFR 71, 2002, Title 10, "Energy," Part 71, "Packaging and Transportation of Radioactive Materials," *Code of Federal Regulations*, Office of the Federal Register.
- 10 CFR 820, 2002, Title 10, "Energy," Part 820, "Procedural Rules for DOE Nuclear Activities," Appendix A, "General Statement of Enforcement Policy" (Price Anderson Amendments Act), *Code of Federal Regulations*, Office of the Federal Register (58 FR 43692, August 17, 1993; as amended at 62 FR 52481, October 8, 1997; and 65 FR 15220, March 22, 2000).
- 10 CFR 830, Subpart A, 2002, Title 10, "Energy," Part 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements," *Code of Federal Regulations*, Office of the Federal Register.
- 10 CFR 830, Subpart B, 2002, Title 10, "Energy," Part 830 "Nuclear Safety Management," Subpart B, "Safety Basis Requirements," *Code of Federal Regulations*, Office of the Federal Register.
- 10 CFR 835.1002, 2002, Title 10, "Energy," Part 835, "Occupational Radiation Protection," *Code of Federal Regulations*, Office of the Federal Register.
- 10 CFR 835.1002, 2002, Title 10, "Energy," Part 835, "Occupational Radiation Protection," Part 1002, "Facility Design and Modification," *Code of Federal Regulations*, Office of the Federal Register.
- 29 CFR 1910, 2002, Title 29, "Labor," Part 1910, "Occupational Safety and Health Standards," *Code of Federal Regulations*, Office of the Federal Register.
- 29 CFR 1926, 2002, Title 29, "Labor," Part 1926, "Safety and Health Regulations for Construction," *Code of Federal Regulations*, Office of the Federal Register.
- 40 CFR 61, Subpart H, 2002, Title 40, "Protection of Environment," Part 61, "National Emissions Standards for Hazardous Air Pollutants," Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," *Code of Federal Regulations*, Office of the Federal Register.
- 40 CFR 112, 2002, Title 40, "Protection of Environment," Part 112, "Oil Pollution Prevention," *Code of Federal Regulations*, Office of the Federal Register.
- 40 CFR 260, 2002, Title 40, "Protection of Environment," Part 260, "Hazardous Waste Management System: General," *Code of Federal Regulations*, Office of the Federal Register.
- 40 CFR 260.20, 2002, Title 40, "Protection of Environment," Part 260, "Hazardous Waste Management System: General," Section 260.20, "General," *Code of Federal Regulations*, Office of the Federal Register.
- 40 CFR 260.22, 2002, Title 40, "Protection of Environment," Part 260, "Hazardous Waste Management System: General," Section 260.22, "Petitions to Amend Part 261 to Exclude a Waste Produced at a Particular Facility," *Code of Federal Regulations*, Office of the Federal Register.

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40 CFR 261, 2002, Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 261, 2002, Subpart C, Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," *Code of Federal Regulations*, Subpart C, "Characteristics of Hazardous Waste," Office of the Federal Register.

40 CFR 261.20, 2002, Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," Subpart C, "Characteristics of Hazardous Waste," Section 261.20, "General," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 261.21, 2002, Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," Subpart C, "Characteristics of Hazardous Waste," Section 261.21, "Characteristic of Ignitibility," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 261.22, 2002, Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," Subpart C, "Characteristics of Hazardous Waste," Section 261.22, "Characteristic of Corrosivity," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 261.23, 2002, Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," Subpart C, "Characteristics of Hazardous Waste," Section 261.23, "Characteristic of Reactivity," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 261.24, 2002, Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," Subpart C, "Characteristics of Hazardous Waste," Section 261.24, "Toxicity Characteristic," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 264, 2002, Title 40, "Protection of Environment," Part 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Activities," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 264.112, 2002, Title 40, "Protection of Environment," Part 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Subpart G, "Closure and Post-Closure," Section 264.112, "Closure Plan; Amendment of Plan," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 268, 2002, Title 40, Protection of Environment, Part 268, "Land Disposal Restrictions," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 268.41, 2002, Title 40, Protection of Environment, Part 268, "Land Disposal Restrictions," Section 268.41, Treatment Standards Expressed as Concentrations in Waste Extract," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 268.42, 2002, Title 40, Protection of Environment, Part 268, "Land Disposal Restrictions," Section 268.42, "Treatment Standards Expressed as Specified Technologies," *Code of Federal Regulations*, Office of the Federal Register.

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- 40 CFR 300, 2002, Title 40, "Protection of Environment," Part 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, Office of the Federal Register.
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OU 7-10 Glovebox Excavator Method Project Design Impacts from Deactivation, Decontamination, and Decommissioning Issues

A.1 INTRODUCTION

This appendix lists the impacts from deactivation, decontamination, and decommissioning (D&D&D) issues on the design of the Operable Unit (OU) 7-10 (Pit 9) Glovebox Excavator Method Project facility and equipment at the Radioactive Waste Management Complex of the Idaho National Engineering and Environmental Laboratory (INEEL).

The facility and equipment design engineers considered D&D&D issues as part of the design for life-cycle costs. To assist in life-cycle design, engineers working on the plans for the facility shutdown and D&D&D phases met with the designers to discuss additional improvements to the designs that would facilitate the work to be performed when the facility has completed its mission and will no longer be needed. The design engineers made the decisions on which suggestions to implement in accordance with overall design needs.

The majority of necessary design features for D&D&D issues were already included in the designs by the engineers. These features are listed first and features added as a result of suggestions by D&D&D personnel are discussed last.

Design impacts from D&D&D are discussed for the following facilities and equipment:

- Retrieval Confinement Structure (RCS)
- Weather enclosure facility (WES)
- Shoring box
- Packaging Glovebox System (PGS)
- Heating and ventilation system
- Excavator
- Piping systems
- Electrical systems

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A.2 DESIGN FEATURES FOR THE DEACTIVATION, DECONTAMINATION, AND DECOMMISSIONING PHASE INCLUDED IN THE ORIGINAL DESIGN

A.2.1 Retrieval Confinement Structure

Features of the RCS that were designed to facilitate D&D&D at the end of the OU 7-10 Glovebox Excavator Method Project are listed below:

- The RCS is of a modular design, which is more easily disassembled than standard frame and skin designs.
- The frame is on the outside of the skin, which makes decontamination easier than if the frame were on the inside.
- The skin is flat, smooth, stainless steel, which is easily decontaminated.
- The seams of the RCS are taped to cover and protect cracks and joints that would hold contamination and be hard to clean. The joint tape can easily be cut or stripped during disassembly.
- No extraneous materials or equipment were placed within the RCS. Minimizing materials and equipment in the RCS confinement area will reduce the time, scope, and cost of D&D&D activities.

A.2.2 Weather Enclosure Structure

Features of the WES that were included in the design to facilitate D&D&D at the end of the project are listed below:

- The WES is a fabric structure, which is more easily disassembled than a standard frame and metal skin design.
- The fabric structure is reusable, which is expected to reduce the amount of D&D&D waste from the project.
- If the WES is accidentally contaminated or becomes unsuitable for reuse, the fabric is more easily disassembled and disposed of than a standard frame and metal skin building. The fabric can be cut into pieces and either added to other disposal boxes as extra fill or rolled into bundles for direct disposal.
- No extraneous materials or equipment were placed within the WES. Minimizing materials in the WES reduces the time, scope, and cost of D&D&D activities and reduces the amount of material and equipment that is at risk of becoming contaminated should a breach or loss of confinement occur.

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A.2.3 Shoring Box

Pinned joints in the shoring box were included in the design to facilitate disassembly during removal of the shoring box during the D&D&D phase. When the decision was made to seal-weld the joints, the advantages of the pinned joints no longer justified the cost (because cutting the shoring box at the joints would now be required anyway), and the design was changed to eliminate the pins.

A.2.4 Packaging Glovebox System

Features of the PGS that were included in the design to facilitate D&D&D following the end of the OU 7-10 Glovebox Excavator Method Project are listed below:

- The glovebox frames are made of carbon steel. Although less easily decontaminated than stainless steel, carbon steel can be decontaminated to levels that achieve project goals. Because carbon steel is less expensive than stainless steel, it reduces overall project costs.
- The inside corners of the gloveboxes are rounded, providing to facilitate decontamination. Because the cost of rounded corners in a glovebox is approximately the same as square corners, this design feature reduces overall costs.
- The glovebox frame at the opening to the RCS is internal (i.e., smaller than) to the RCS frame. This configuration would allow the glovebox to be slid inside the RCS for decommissioning once the RCS skin above the opening has been removed. While this is not the selected approach, it does allow an alternate approach for D&D&D flexibility. For example, this approach may become necessary in the event that radioactive contamination levels in the gloveboxes are significantly higher than expected.
- The support structures below the gloveboxes are bolted to the glovebox frames. This allows the glovebox frames to easily be unbolted from the supports, then the glovebox either may be slid into the RCS or laid over on the floor next to the supports.
- The transfer cart conveyance system uses a dry screw. This feature eliminates grease on the screw, which would be difficult to decontaminate and could result the creation of mixed transuranic (MTRU) waste.
- A method of containing any contamination spread that may occur from drumout operations is included in the PGS design. Initially, the design included a ventilation trunk near the drumout ports. The design has since been changed to add a full enclosure around each drumout operation that is connected to the high-efficiency particulate air (HEPA) filtered heating and ventilation (H&V) system. These enclosures form a buffer zone between the highly contaminated glovebox interiors and the clean WES.

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A.2.5 Heating and Ventilation System

Features of the heating and ventilation system that were included in the design to facilitate D&D&D at the end of the project are listed below:

- Radiological survey ports are located upstream and downstream of the primary exhaust HEPA filter bank. These ports will allow the radiological contamination levels in the ducting to be determined before dismantlement, which will improve the safety of the operation and decrease the cost.
- The length of the air ducts has been minimized. The air ducts are round and will be made of stainless steel, which is easier to decontaminate than rectangular ducts made of galvanized carbon steel. Flexible ducting, which tends to difficult to decontaminate has not been used.
- The H&V fans are variable speed. This design allows the air flow to be decreased during shutdown and layup, reducing wear and electricity consumption. Variable-speed fans also will support fixative fogging should this activity become necessary.
- The H&V fans are located downstream of the HEPA filters, reducing the expected contamination levels and providing a potential for reuse.
- The H&V system is designed to operate year round. This design allows shutdown and dismantlement activities to take place in heat and cold, and provides the necessary operating environment for radiological detectors needed during all phases.

A.2.6 Excavator

Features relative to the excavator that will facilitate D&D&D at the end of the project are listed below:

- Lines to the power steering and brake control systems will be capped off once the excavator is installed to eliminate potential contamination of these systems through the hydraulic fluid. The supply and return hydraulic lines will be capped to the power steering control valve. The brake pump, suction line, and return line will be disconnected and capped.
- The outriggers and cylinders will be removed and the hydraulic lines capped off at the control valve to reduce the equipment that may become contaminated.
- The front-end loader control valve and hydraulics will be disconnected and capped once the excavator is installed to reduce the equipment that may become contaminated. The loader hydraulic cylinders will be removed for mounting purposes.
- The excavator will be fitted with a self-greasing system, which will prevent the need to grease the fittings after any layup period and before use during D&D&D.

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- The hydraulic fluid will be a nonhazardous, environmentally safe fluid recommended by the equipment manufacturer. Disposal of this fluid will be easier than for standard petroleum-based hydraulic fluids.
- An in-line hydraulic fluid sampling system will be installed. This will facilitate fluid sampling during D&D&D operations. The sampling location is immediately upstream from the filter.
- The hydraulic fluid filter has been moved to a more accessible location. The new location allows (or permits) easier access for changing the potentially radioactively contaminated filter and for monitoring the filter for radiation levels.
- A large drip pan will be used under the excavator. Extra drip pans will be located under the hydraulic fluid and fuel tanks.
- A drain is located in the bottom of the inner seal area where the excavator arm interfaces with the RCS. When decontaminating this hard-to-reach area, the drain will provide a method of removing from the area any water that may be used in decontamination. This drain was already planned for draining any hydraulic fluid leaks, but also will assist decontamination efforts if water accumulates in the seal area.

A.2.7 Dust-Suppression System

Features relative to the dust-suppression system (DSS) that will facilitate D&D&D at the end of the project are listed below:

- Check valves and isolation valves just outside the confinement wall of all piping systems are included in the design to prevent backflow during operations and after the systems are drained during facility shutdown or D&D&D. These valves were added to some of the piping systems at the suggestion of the shutdown and D&D&D engineers, and some of the systems already included these valves in the design.
- The DSS is the primary method of contamination control in the facility. The use of this system is expected to greatly reduce the scope of the decontamination and dismantlement activities of the RCS, PGS, and associated equipment.
- The DSS, as designed, will support the facility shutdown process by reducing contamination spread from the pit after retrieval operations have been completed. The DSS is remotely controlled, which provides operators flexibility during the shutdown process to use the system from a different location than during operations.
- The DSS controls and tanks are located outside the primary confinement to prevent contamination of DSS equipment.
- The DSS uses flexible hose, which is more easily dismantled than hard piping.

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- The DSS is a skid-mounted, reusable piece of equipment. Modular design allows for easy removal from the facility.
- All piping is routed outside of primary confinement boundaries whenever feasible. This will reduce the amount of contaminated materials that will be generated during D&D&D. Penetrations will be made for each branch, instead of making one penetration and running the distribution piping inside the confinement boundary.
- The amount of piping has been minimized.

A.2.8 Compressed Air Systems

- The plant air and breathing air compressors are located off the pit area, reducing the radiological survey requirements for release of the systems. The compressors are modular (i.e., skid mounted) and easily removed by a forklift during D&D&D.
- All piping is routed outside of primary confinement boundaries whenever feasible. This will reduce the amount of contaminated materials that will be generated during D&D&D. Penetrations will be made for each branch, instead of making one penetration and running the distribution piping inside the confinement boundary.
- The amount of piping has been minimized.
- The plant air and breathing air compressors are reusable equipment, which reduces the amount of waste produced by project activities.

A.2.9 Electrical Systems

- Lights are located outside the primary confinement boundary of the PGS and RCS. This eliminates the need to decontaminate or dispose of the materials as mixed transuranic (TRU) waste.
- Electrical wiring and equipment are located outside the primary confinement boundary of the PGS and RCS wherever possible. This reduces the amount of material requiring decontamination or disposal as mixed TRU waste.
- Equipment inside the WES has been minimized, which minimizes the amount of equipment that could potentially become contaminated if primary confinement is breached. Locating equipment outside the WES also reduces the radiological survey requirements for equipment reuse.
- Low-mercury fluorescent light bulbs suitable for landfill disposal are used.

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- The electric transformer and main distribution panel are located off the pit. Locating the equipment off the pit provides to facilitate radiological release for equipment reuse.
- The standby diesel generator is located on a trailer in the project work area outside of the pit boundary, which is away from areas of potential contamination. This location is expected to reduce the radiological release requirements and the modular design facilitates removal by towing.
- The excavator will be refueled from the fuel tank located on the diesel generator trailer, which reduces the potential for spills that would require remediation during D&D&D. The generator also is provided with a spill container for fuel and oil.
- The power distribution panel substation is reused from a previous project. This reduces the overall waste from project activities. The substation may be used again for future projects.
- Approximately half of the high-voltage cabling is reused from a previous project, which reduces the overall waste from project activities.

A.3 DESIGN FEATURES ADDED FOR THE DEACTIVATION, DECONTAMINATION, AND DECOMMISSIONING PHASE

A3.1 Retrieval Confinement Structure

A thin, stainless steel plate will cover the floor of the RCS. This plate is designed to prevent contamination from reaching the Facility Floor Structure in the RCS. The amount of mixed TRU waste requiring decontamination and disposal as LLW is reduced from the entire floor structure to a thin plate.

A3.2 Weather Enclosure Structure

Nothing identified.

A3.3 Shoring Box

The shoring box assembly will include a geotextile fabric (secondary) skirt under the stainless steel skirt. This change was developed to mitigate problems associated with contamination reaching the back of the shoring box if the soil beneath the box is undercut during excavation. The flexible geotextile fabric is expected to more easily extend downward with the sloughing soil than the rigid metal skirt. This adherence to the moving soil would fill any holes created below the floor better than a rigid sheet of metal.

A3.4 Packaging Glovebox System

Nothing identified.

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A3.5 Heating and Ventilation System

The facility air emissions stack will be designed to facilitate radiological surveillance and disposal in approved waste boxes. The stack is expected to be radiologically clean and disposable as industrial waste, but must either be surveyed to ensure cleanliness or treated as contaminated. Breaks in the pipe length with flanges allow for the pieces to be disassembled without cutting and facilitate surveys for disposition. The design will evaluate the cost of flanges and welded joints to determine the number and location of flanged joints and welded joints, if any.

A3.6 Excavator

- A HEPA filter will be added to the hydraulic fluid tank to address venting from the tank when hydraulic fluid temperature increases.
- The unused hydraulic lines will be capped in the most accessible locations. This criterion takes precedence over reducing the amount of potentially contaminated lines by capping as close to the tee as possible.
- Epoxy paint will be used on any areas of the excavator that require repainting as part of design modification, especially the inner seal. Any potential savings in D&D&D operations do not justify the cost of repainting other parts of the excavator with epoxy paint.
- The capability for a small shear will be added to the excavator, if feasible. The ability to connect a shear to the excavator will provide significant cost savings to D&D&D. Using a shear from outside the RCS is also a much safer method of dismantling than manual methods performed inside the RCS.
- A range of available hydraulic cylinder seal types will be considered to determine if a better seal is available that could reduce or potentially eliminate the contamination from reaching the inside of the hydraulic system. Although experience from the D&D&D organization has shown no detectable contamination of hydraulic systems in D&D&D equipment, the potentially very high levels of plutonium inside the RCS and the close proximity of hydraulic cylinders to the waste warrant preparation for contamination of the excavator hydraulic system. According to the engineer from Caterpillar contracted to assist in design of this excavator more effective seals are available. It is possible that the hydraulic system could be kept clean from contamination, or contamination levels kept to a minimum. If accomplished, this is expected to be a considerable cost savings and waste reduction to the project. In previous work, the Caterpillar excavator engineer found that Viton seals were excellent for chemical and radiological resistance.

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A3.7 Dust-Suppression System

A drain and sample valve will be added to the DSS water tank. This will provide an easy method to sample the water in the tank to ensure that it is not radiologically contaminated. The drain also will simplify pumping the water into a tanker truck for disposal.

A3.8 Compressed Air Systems

Nothing identified.

A3.9 Electrical Systems

Nothing identified.

A.4 DESIGN FEATURES DISCUSSED BUT NOT ADDED FOR THE DEACTIVATION, DECONTAMINATION, AND DECOMMISSIONING PHASE

Many suggestions were made that would have reduced the costs of D&D&D that were not implemented by design because of the overall project costs or other important factors. Most of these suggestions are not discussed in this appendix. Noteworthy suggestions are discussed below.

A4.1 Retrieval Confinement Structure

Nothing identified.

A4.2 Weather Enclosure Structure

Nothing identified.

A4.3 Shoring Box

Making the shoring box skirt from a geotextile fabric (attached at the base of the shoring box), instead of a steel sheet (attached on the back side of the shoring box at ground level) would likely resolve the problem of contamination on the back of the shoring box if the box is undercut during excavation. The flexible geotextile fabric would fill holes below the floor better than a rigid sheet of metal as the skirt is currently designed. And if the fabric was attached to the base of the shoring box, it would always be between the shoring box and the exposed waste.

A4.4 Packaging Glovebox System

Nothing identified.

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A4.5 Heating and Ventilation System

Nothing identified.

A4.6 Excavator

- The possibility of booting any of the cylinders to reduce potential contamination paths was discussed. The design team had already looked at this and was unable to use any boots due to the lack of room and the restriction boots would put on cylinder stroke.
- Any potential savings in D&D&D operations do not justify the cost of repainting most parts of the excavator with epoxy paint.

A4.7 Dust-Suppression System

Nothing identified.

A4.8 Compressed Air Systems

Nothing identified.

A4.9 Electrical Systems

Nothing identified.

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Alternative Process

B1. BACKGROUND

Plan (PLN) –343, “OU 7-10 Glovebox Excavator Method Project Facility Shutdown Plan and Deactivation, Decontamination, and Decommissioning Pre-Plan,” was prepared with input from OU 7-10 Glovebox Excavator Method Project radiological engineering and industrial safety personnel. That input included a suggestion for an alternate approach that recommended backfilling the open pit before decontamination efforts begin within the Retrieval Confinement Structure (RCS). In this way, the open pit would be eliminated as a continued source of radiological exposure and contamination spread.

This appendix contains a detailed explanation of the alternate approach. Although this modified approach was not adopted, the overall merit of the approach involves the trade-off of several important factors as does that of the selected approach. Most importantly, both approaches rely on a project assumption that the dust-suppression system will be adequate for controlling the spread of contamination from the pit during waste retrieval operations; however, this assumption cannot be validated until waste retrieval operations have commenced. Therefore, the assumption represents a risk to the successful completion of shutdown operations. This assumption can be extended to include adequate control of contamination during shutdown operations.

“Adequate,” as used in this assumption, implies that (1) through the use of the dust-suppression system the spread of contamination will be minimal in the absence of activities that disturb the exposed waste and soil and (2) air circulation alone will not be sufficient to cause the wetted contamination to spread.

The suggestion from the radiological engineering and industrial safety personnel appears to reflect a loss of confidence in this assumption. If this is indeed the case, it may be advisable to perform a value-engineering or trade-off analysis to determine which approach would be superior. This analysis, if performed, will need to be accomplished before the preparation of detailed work plans and procedures for the shutdown phase.

B2. PROCESS DESCRIPTION – ALTERNATE APPROACH

The following sections provide conceptual step-by-step directions for performing the alternate approach recommended for backfilling the open pit before decontamination efforts are performed within the RCS.

B2.1 Decontamination of the Retrieval Confinement System Floor

After completion of waste retrieval and underburden sampling, with handrails removed, clean as much of the RCS floor as possible using the excavator and return any spilled material back to the pit.

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B2.2 Decontamination of the Packaging Glovebox Systems

Clean the Packaging Glovebox System (PGS) gloveboxes using a top-down general approach through the existing gloves, as described below:

1. Remove all unnecessary tools, equipment, and supplies (e.g., sample bags, unused cart liners, fire suppressant sand, and liquid absorbent) and package through the drumout port as waste.
2. Sweep up spillage and gross (i.e., visible) waste materials. Place sweepings into waste drums (at drumout ports) and package as mixed transuranic (MTRU) waste.
3. Vacuum up residual visible materials.
4. Clean transfer carts, rails, and drive systems by wet-wiping and vacuuming. Clean the hoist rails and hoist by wet-wiping.
5. Wet-wipe interior glovebox surfaces (e.g., floor, windows, gloves, glove and bag-out ports, drum ports, and covers). Use long-reach tools for hard-to-reach areas.
6. Deactivate PGS-1 and -2 systems (e.g., constant air monitors, remote air monitors, and lights) and cover glove and sample ports.

B2.3 Grouting the Excavated Portion of the Pit

The purpose for grouting the excavated portion of the OU 7-10 pit before performing D&D&D activities is to cover exposed waste and to stabilize the waste zone. The steps for this procedure are listed below:

1. If possible, the RCS portion of the grout hose should be prestaged within the RCS before waste-retrieval operations begin. If possible, it should be connected to the RCS grout penetration and coiled up on the wall within reach of the gloveports used for end-effector changes. Before grouting operations begin, the hose would be hung from a bracket (also staged in the RCS before waste retrieval operations) that can be clipped to the left side of the excavator bucket. The cap on the free end of the grout hose is required to remain in place to prevent contamination from entering the hose. Another cap is in place on the outside (i.e., Weather Enclosure Structure [WES] side) of the RCS grout penetration. In this way, it may be possible to deploy the grout hose during shutdown operations without personnel entry into the RCS confinement area.
2. If the first method (i.e., Number 1 above) is not possible, then the following sequence will be followed. First, the grout-pumper truck hose will be connected to the external side of the WES penetration. Next, the WES hose section (between the WES and the RCS) will be connected to the internal side of the WES penetration and then to the external side of the RCS penetration (see Figure B-1). Radiological control technicians (RCTs) and decontamination workers will don appropriate personal protective equipment (PPE) (e.g., supplied air respirators) before entering the

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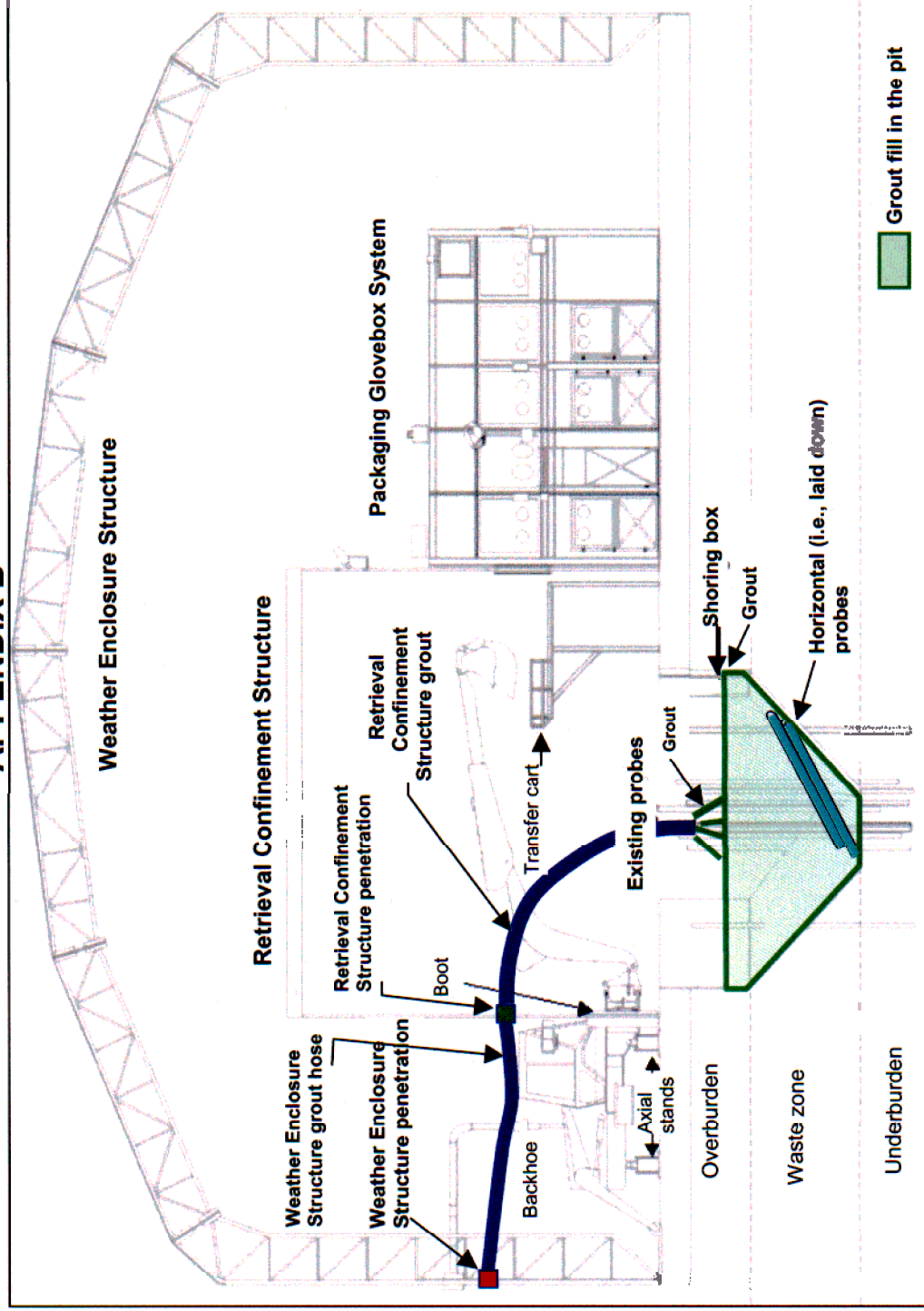


Figure B-1. Drawing showing main parts of the OU 7-10 Glovebox Excavator Method Project equipment within the Weather Enclosure Structure.

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3. RCS to clean a path (e.g., floor, penetration cap, and adjacent wall areas) to the RCS grout penetration. Depending on the amount of waste and level of contamination present, any or all of the following methods could be used to clean the path:
 - a. Wet the spilled waste and soil with water from a low-pressure sprayer, scoop it into a plastic bag, and place the bag in the pit
 - b. Vacuum using a high-efficiency particulate air (HEPA) -filtered vacuum
 - c. Wet-wipe with dampened maslins on long-handled mops.
4. Workers will retrieve the grout hose (hose has friction-fit caps in place at both ends) and bracket for the excavator bucket that is brought to the personnel access door by other workers outside the confinement area. The RCS grout penetration cap within the RCS and the grout hose cap (i.e., mating end of the hose) then will be removed and the grout hose connected to the RCS grout penetration. The bracket will be placed on the left side of the excavator bucket and the grout hose will be suspended from the bracket. Workers and RCTs then will exit the RCS confinement area.
5. With all hoses now connected and the friction-fit cap still in place on free end of RCS grout hose, the excavator operator will position the bucket and hose near the bottom of the excavation.
6. Using radio communications, the excavator operator will call for pumping to commence.
7. Mixer trucks will deliver grout loads to the pumper truck.
8. The pumper truck will pump grout through the installed hoses and into the excavation area. Air pressure or grout will cause the cap on the free end of the RCS grout hose to blow off.
9. The excavation will be filled with grout. The grout is fluid enough to fill voids around the horizontal (laid down) and vertical probes. Operators will continue to fill the excavation with grout until the grout level reaches 15 cm (6 in.) above the bottom edge of the shoring box. Approximately 1.5 m (5 ft) of the shoring box will remain exposed, but only 0.9 m (3 ft) below the existing OU 7-10 grade (surface level of surrounding pit area).
10. When the grout reaches the desired level, the excavator operator will radio the pumper truck and mixer operators to cease grout pumping. Then water will be delivered to the pumper truck to flush the grout lines (i.e., hoses). The excavator operator will stop the flush when clean water appears from the free end of the RCS grout hose.
11. The excavator operator will position the RCS grout hose to form a U-bend (or, alternatively, an in-line backflow preventer may have been procured with the hose) in the hose to prevent contaminated air from exiting through the hose. (Note: The WES penetration may need to be higher than the RCS penetration to assist in emptying the grout hose.)

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12. The free end of RCS grout hose will be positioned lower than the RCS penetration and when water flow has stopped, the WES external hose connection will be broken and the penetration capped.
13. The WES section of grout hose will be disconnected from the RCS penetration (outside the confinement barrier). A cap will be reinstalled over the RCS penetration. A catch basin will collect any spilled water and grout from the WES section of the hose. The WES section of the grout hose then will be disconnected from the WES penetration (internal side) and the hose placed in a bag for disposal during D&D&D (as industrial waste or low-level waste, depending on results of radiological smears).
14. The U-bend in the RCS grout hose will be removed by extending the hose to its full length and angling it downward, allowing remaining water and grout to drain into the pit.
15. The RCS section of grout hose will be disconnected from the RCS grout penetration either through gloveports or by personnel entry into the confinement. The RCS penetration then will be cleaned and recapped.
16. The hose (RCS section) will be lowered into a bag brought into the RCS by workers and the free (i.e., delivery) end will be detached from the bracket. The bracket then will be removed from the bucket and placed in the bag with the hose. The bag will be sealed and left for D&D&D. Alternatively, if it would fit, the hose could be placed in a 55-gal drum brought in through PGS-3 or the personnel access door. Still another option might be to bury it in the pit (with no bag).
17. Personnel will exit the confinement and allow the grout to cure.

B2.4 Cleaning the Retrieval Confinement Structure Internal Surfaces and Equipment

After the grout has cured, the internal surfaces and equipment of the RCS will be cleaned. Those steps are listed below:

1. Entry to the confinement by personnel will be made with RCT support.
2. The grout will be covered with a plastic sheet and holes will be cut to accommodate the vertical probes.
3. The excavator end-effectors and excavator arm will be cleaned.
4. The excavator arm will be wrapped in plastic to contain residual removable contamination. (Note: this should be accomplished in such a way as to permit continued use.)
5. The RCS floor and walls will be cleaned up to 2 m (6.5 ft) using the following methods:
 - a. Wet the spilled waste and soil with water from a low-pressure sprayer, scoop the waste and soil into a bag, and place the bag in a 55-gal drum

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- b. Vacuum using a HEPA-filtered vacuum
 - c. Wet-wipe floor and walls with dampened maslins on long-handled mops.
6. The RCS windows, gloveports, and transfer cart supports will be cleaned.
7. The probe tops and inside of shoring box will be cleaned at locations where they will be cut. Some grout will need to be removed to expose the bottom of the shoring box in these locations.
8. The shoring box will be wrapped in plastic sheeting as it is cleaned.
9. A temporary airlock then will be constructed inside the vestibule (outside of the RCS double doors) for bringing the articulated boom manlift into the RCS confinement area. (Note: This airlock also will be used by the D&D&D crews later during dismantlement activities.)
10. The area around the doors then will be cleaned and the RCS double doors will be unsealed.
11. The doors will be opened and the articulated boom manlift will be driven into the RCS.
12. The doors then will be closed and resealed.
13. The RCS ceiling and upper walls (now accessible through the use of the manlift) then will be decontaminated.
14. The PGS-1 and -2 transfer cart support structures in the RCS will be removed. The rails, drive screws, and transfer carts for PGS-1 and -2 also will be removed.
15. The excavator will be used to pass the last of the waste and secondary waste (i.e., from decontamination) out to PGS-3. The 55-gal drums then will be overpacked into 85-gal drums in the drumout enclosure.
16. The PGS-3 transfer cart support structure, rails, drive screw, and transfer cart will be removed.
17. Decontamination of the RCS ceiling and upper wall will be completed.
 - a. If necessary, the RCS lower walls, windows, and ports can be recleaned
 - b. If necessary, the RCS floor can be recleaned
 - c. The RCTs then will perform characterization surveys and smears using standard D&D&D methods until the desired contamination levels have been achieved.
18. Workers then will certify that waste streams to be generated are acceptable for intended disposal paths.

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B2.5 Spraying Fixant

A coating of fixant (i.e., latex paint) will be sprayed to affix any remaining contaminants to existing surfaces, as described below:

1. Locations that are not to be coated will be protectively masked (e.g., windows, door frames, and gloves).
2. The PGS interior surfaces will be spray-coated with fixant.
3. The RCS interior surfaces will be spray-coated with fixant including the ceiling, walls, and floor.
4. The plastic then will be removed from the shoring box and the interior side of the shoring box will be spray coated with fixant.
5. Workers then will spray coat the tops of the vertical probes with fixant (i.e., latex paint).
6. Workers then will remove the plastic wrapping from the excavator arm and end-effectors and coat them with fixant.

B2.6 Conclusion

The step-by-step actions described in this appendix, when combined with the actions described in PLN-343 to secure the equipment in the WES, should be sufficient to place the project facility in a safe shutdown condition.

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